2025-26 DCIG TOP 5 MODERN SDS BLOCK STORAGE SOLUTIONS

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Table of Contents

3 SDS Block Storage Solutions Ready for Production Deployments

3 Modern SDS Block Storage Solution Differentiators

4 Common SDS Block Storage Use Cases

4 Drivers for Modern SDS Block Storage Solution Adoption

5 Common Features across All Modern SDS Block Storage Solutions

6 Distinguishing Features of the DCIG TOP 5 Modern SDS Block Storage Solutions

7 Differences between the TOP 5 Modern SDS Block Storage Solutions

8 TOP 5 Modern SDS Block Storage Solution Profiles

- 9 StorPool Storage
- 10 LINBIT SDS
- 11 Nexustorage Nexfs
- 12 StoneFly StoneFusion
- 13 Zadara Storage Cloud

14 Modern SDS Block Storage Solutions Inclusion Criteria

14 DCIG Disclosures

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Modern SDS Block Storage Solutions

SOLUTIONS EVALUATED (IN ALPHABETICAL ORDER):

1. DataCore SANsymphony
2. Dell UnityVSA
3. Hitachi Vantara VSP One SDS Block
4. IBM Spectrum Virtualize
5. IBM Storage Ceph
6. LINBIT SDS
7. LINBIT VSAN
8. NetApp ONTAP Select
9. Nexustorage Nexfs
10. Nutanix AOS
11. Open-E JovianDSS
12. OSNexus QuantaStor
13. Starwind Virtual SAN
14. StoneFly StoneFusion
15. StorMagic SvSAN
16. StorONE Data Storage Platform
17. StorPool Storage
18. Veritas InfoScale
19. VMware by Broadcom vSAN OSA
20. VMware by Broadcom vSAN ESA
21. Zadara Storage Cloud

ENTERPRISE SDS BLOCK STORAGE SOLUTION FEATURES EVALUATED

- Data Protection and Security
- Deployment Options
- Product and Performance Management
- Technical Support

SDS Block Storage Solutions Ready for Production Deployments

Software-defined storage (SDS) block storage solutions have come of age. Sometimes viewed in the past as too hard, too risky, or unproven, those days are over. Rather, any organizations that still view SDS block storage solutions through this lens do themselves a disservice.

SDS block storage solution providers have made significant strides to mitigate the risk and perceived stigma associated with deploying their solutions into production environments. For instance, these providers now:

- Certify their SDS block storage solution with multiple leading applications, databases, hypervisors, and operating systems.
- Make their SDS block storage software available in multiple clouds.
- Offer ample evidence and proof points to demonstrate their SDS block storage solution performs as well or better than comparable storage appliances from hardware providers.
- Offer enterprise-levels of upfront and ongoing technical support and customer training to ease deployments and ensure successful ongoing operations.

These and other factors should give organizations the assurances they need to confidently move forward with deploying SDS block storage solutions. They also help explain why researchers forecast the market for SDS storage solutions will grow significantly. Two research firms forecast an increase in the SDS market from about $US50+ billion in 2024 to as high as $US260+ billion by 2029.[1]

Its SDS block storage's other features that should contribute to its accelerated growth and adoption in the coming years. For instance, depending on the SDS block storage solution, organizations obtain new flexibility to virtualize multiple types of storage. Storage choices may range from storage arrays to disk drives available in x86 server hardware to cloud object storage.

SDS block storage solutions also help simplify the tasks associated with managing environments with block storage networking protocols. This simplification can range from migrating data between systems to centralizing the volume management of the virtualized storage. It may also alleviate complex zoning, LUN masking, and other storage networking tasks commonly associated with managing block storage environments.

Modern SDS Block Storage Solution Differentiators

DCIG initiated research into SDS block storage to help organizations make the best choice among available solutions. This Modern edition specifically evaluates SDS block storage solutions for their suitability for deployment into organizations that possess modern IT infrastructures. These IT infrastructures typically have come into existence in the last decade.

The providers optimize their SDS block storage solutions for deployment in Linux-centric, cloud-based computing environments. To do so, the SDS block storage software provider may provide its own specific block storage drivers for KVM, Linux VMs or both. Alternatively, or additionally, it offers support for modern IP block-based storage networking protocols, such as NVMe/TCP.

These SDS providers also tend to offer comprehensive, robust APIs that facilitate easy, fast adoption in cloud environments with software-defined data center (SDDC) architectures. Using the APIs offered by these solutions, organizations may better achieve objectives of automating storage management and provisioning. These APIs permit organizations to perform most or all storage operations without using graphical user (GUI) or command line interfaces (CLI).

Granted, some modern SDS block storage solutions offer CLIs, GUIs, preconfigured hardware appliances and support operating systems other than Linux. However, DCIG would not characterize modern SDS block storage solutions as possessing all these attributes.

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Common SDS Block Storage Use Cases

Many business- and mission-critical applications use block or structured data to operate optimally. Applications such as databases and transactional workloads often fall into these business-critical and mission-critical categories. They need the high-performance, low latency, and high throughput that block storage protocols natively provide.

The main use cases for block storage include:

- ***Content delivery networks (CDNs):*** Block storage can store and deliver large amounts of static content, such as images, videos, and files.
- ***Database systems:*** Relational databases (Oracle, MySQL, PostgreSQL) and NoSQL databases (like MongoDB, Cassandra) often rely on block storage for optimal performance and data integrity.
- ***High-performance computing:*** Scientific simulations, financial modeling, and other computationally intensive workloads need the low latency and high IOPS provided by block storage.
- ***Real-time analytics:*** Applications that require real-time processing of large datasets use block storage. These applications include real-time processing of large datasets, such as fraud detection or algorithmic trading.
- ***Virtualization:*** Virtualized environments running hypervisors such as VMware vSphere and Hyper-V often use block storage. Block storage often provides the best performance for their guest VMs, and the applications hosted on them.

Drivers for Modern SDS Block Storage Solution Adoption

DCIG identified over 20 different SDS block storage solutions that enterprises could deploy in various ways. Deployment options could include software for deployment on-premises, in the cloud, a preconfigured hardware appliance, or a combination of these.

Some providers also partner with hardware OEMs so that organizations may order appliances from their preferred OEM. A few providers even make infrastructure-as-a-service (IaaS) available as an option. If electing to use IaaS, the provider manages the software after an organization deploys it.

Organizations increasingly encounter new use cases that demand the use of storage solutions other than traditional storage hardware appliances. While edge locations may be the first that come to mind, organizations with modern IT infrastructures possess additional business drivers for adopting SDS block storage solutions:

- ***Common storage management experience.*** Deploying SDS block storage solutions in the cloud immediately emerges as a common use case. Organizations may want to have the same block storage management experience both on-premises and in the cloud.

  Many of the SDS block storage solutions meet many if not all operational, production requirements. This software may offer features such as replication, snapshots, data reduction, and data migration.

  Additionally, some organizations seek a more robust hybrid cloud experience. Some SDS block storage solutions give them the flexibility to host the same workloads both on-premises and in the cloud. In some cases, they can even move the workloads back and forth between on-premises and the cloud.
- ***Identifying a VMware vSAN alternative.*** Broadcom has further incentivized organizations to explore alternative SDS block storage options. In December 2023, Broadcom announced that vSAN had become part of VMware Cloud Foundation (VCF) and VMware vSphere Foundation (VVF).[2] As a result, organizations may no longer acquire vSAN as a standalone solution. This may prompt existing vSAN clients to identify a new SDS block storage solution.

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- ***Cybersecurity and ransomware concerns.*** Organizations have increased concerns about cybersecurity attacks in general and ransomware attacks specifically. To address these concerns, DCIG evaluated the various cybersecurity capabilities of each SDS block storage solution.

  DCIG used the National Institute of Science and Technology's (NIST) Cybersecurity Framework to focus its research in this area. Using these guidelines, DCIG evaluated how well each SDS block-based storage solution delivered on the NIST's five cybersecurity categories: identify, protect, detect, respond, and recover.

Organizations have increased concerns about cybersecurity attacks in general and ransomware attacks specifically.

Common Features across All Modern SDS Block Storage Solutions

DCIG evaluated 21 different SDS block storage solutions in preparing this report. Across these 21 SDS block storage solutions DCIG evaluated over 325 features on each software product. In evaluating these solutions, DCIG often finds that all evaluated products support a subset of the evaluated features which held true again in this report.

However, the number of evaluated features that all evaluated products supported was lower than normal. DCIG only identified three features of the 325+ evaluated features that all 21 products universally offered and supported. These included:

- ***Deployment of a cluster in a single physical data center.*** Every SDS block storage solution that DCIG evaluated supported at least one type of cluster configuration to provide high availability. In most cases, each SDS block storage solution supports multiple different types of cluster deployments. However, a single physical data center cluster represents the only one of the six configurations that all 21 products supported.
- ***Web-based GUI.*** Using a web-based GUI to access and manage a product has become a de facto standard. This standard carries over to managing SDS block storage solutions.
- ***24x7x365 technical support with 4-hour response times.*** The availability of technical support 24 hours a day, 7 days a week, 365 days a year with 4-hour response times represents the baseline for enterprise solutions. All providers of SDS block storage solutions offer technical support packages that met this standard.

Despite these 21 solutions only sharing support for these three features, DCIG identified nine other features that 85 percent or more of the products supported. These included:

1. ***Back-end NVMe and SAS storage connectivity.*** SDS block storage solutions often support multiple storage networking protocols to communicate with backend storage. While no one back-end storage protocol was universally supported by all SDS block storage solutions, 85 percent supported either NVMe (Non-volatile Memory Express) or SAS (Serial attached SCSI).
2. ***Data encryption.*** Encrypting data at-rest takes on added importance in SDS block storage solutions. Organizations may manage the SDS block storage software and underlying storage hardware separately. As a result, storage hardware removed from the SDS block storage environment could contain data in a readable format. Encrypting data stored on the storage devices mitigates this possibility. 85 percent of the SDS block storage solutions support at-rest AES-256 encryption to help prevent this occurrence.
3. ***Email, online knowledge base, and phone support.*** The methods that providers offer for support and contacting them continue to evolve. Contact methods and support options that organizations could once assume would always be there may no longer hold true. That said, contacting providers by email or phone or the ability to access an online knowledge base still holds true for 95 percent of the SDS block storage solutions evaluated.

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All the SDS block storage solutions reviewed offered multiple non-disruptive upgrade options of a minute or less of downtime.

4. ***iSCSI storage networking protocol support.*** Being focused on block storage, one might expect all the SDS block storage solutions to share support for one block storage networking protocol. This was not the case. 85 percent did, however, support the iSCSI storage networking protocol. The next most supported storage networking protocol across all evaluated solutions was NVMe/TCP.
5. ***Multiple data protection options.*** Quickly creating copies of production data on multiple storage types represents one of SDS block storage's key benefits. Organizations may then use these copies for backup, archiving, testing, and other purposes. While all the evaluated SDS block storage solutions do not universally support one replication technology, they do support several. 85 percent or more support asynchronous replication, clones, and crash-consistent snapshots.
6. ***Non-disruptive upgrades.*** All the SDS block storage solutions reviewed offered multiple non-disruptive upgrade options of a minute or less of downtime. No one of the four non-disruptive upgrade options was supported by all SDS block storage solutions. However, 85 percent supported non-disruptive virtual appliance or controller replacement. One way to upgrade non-disruptively includes migrating data from one virtualized storage target to another. These upgrades without downtime can be performed while adding or replacing a virtual appliance controller, or when doing a code upgrade.
7. ***Options to scale the SDS block storage solution either up or out.*** 85 percent or more of the SDS block storage solutions supported either scale up or scale out deployments. Scale up allows organizations to add more storage resources into a single virtual or physical appliance. Scale out lets organizations add virtual or physical storage appliances or controllers that are part of a single namespace or clustered instance.
8. ***REST APIs.*** More organizations want to centrally manage their IT infrastructure using a single third-party tool or console. To achieve this end, they expect any new hardware or software they introduce into their IT environment to support this objective. 95 percent of the SDS block storage solutions offer REST APIs to support this type of centralized management.
9. ***Role-based access controls (RBAC).*** SDS block storage solutions often host data that is both critical to an organization's operations and sensitive in nature. These conditions make it imperative that organizations control who can access these systems, under what conditions, and the changes they can make. 85 percent of these solutions offer role-based access controls to help organizations meet these requirements.

Distinguishing Features of the DCIG TOP 5 Modern SDS Block Storage Solutions

In addition to supporting the features listed above, all DCIG TOP 5 Modern SDS Block Storage solutions support the following features. These include:

- ***Additional clustering and replication options.*** Each of these TOP 5 solutions offers organizations additional clustering and replication options. Each supports cluster-level and node-level redundancy. Each also offers multiple forms of replication. Replication options that all TOP 5 solutions offer include asynchronous, clones, continuous data protection (periodic), multi-site, and synchronous.
- ***At-rest AES-256 data encryption.*** These TOP 5 modern SDS solutions better account for the cyber risks and threats that today's organizations face. Each offers AES-256 encryption as an option to better protect the data at-rest on their systems.
- ***Data migrations.*** Seamlessly and non-disruptively migrating data between virtualized storage has always represented one of the big appeals of SDS solutions. Each TOP 5 solution delivers on this promise by enabling these types of data migrations between the underlying virtualized physical storage.

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Each TOP 5 solution offers support for specific features that MSPs typically demand, such as multi-tenancy through logical separation of storage and options such as thin provisioning.

- ***Host-facing iSCSI storage networking protocols.*** Each of the TOP 5 modern SDS block storage solutions support iSCSI, the most common IP block storage networking protocol for host connectivity.
- ***Multi-tenancy.*** Managed service providers (MSPs) often represent the first adopters and users of the latest, most cost-effective technologies. Modern SDS block storage solutions fall into this category with all providers reporting high levels of usage of their solution among MSPs. As such, each one offers support for specific features that MSPs typically demand, such as multi-tenancy through logical separation of storage and options such as thin provisioning.
- ***REST API.*** Supporting a REST API becomes a prerequisite for an SDS block storage solution to offer in any cloud environment. Each TOP 5 solution offers REST APIs to support automated storage operations.
- ***Scale-out architecture on bare metal, commodity server hardware.*** Each modern TOP 5 SDS block storage solution supports and utilizes the scale-out architecture that all public cloud hyperscale providers also use. They each do so utilizing commodity server hardware through which each one supports the creation of a hyperconverged infrastructure (HCI).
- ***Shared nothing architecture.*** Organizations knowledgeable about possible SDS pitfalls sometime express concerns about underlying virtualized storage hardware becoming oversubscribed and performing poorly. The TOP 5 solutions each offer shared nothing architectures. Using this technology, each virtual storage appliance (VSA) or controller only manages the pool of storage connected to it, sharing it with no other controller or VSA.
- ***Software licensing with annual and multi-year subscriptions.*** Organizations may obtain software licenses for any of these solutions via either annual or multi-year software licenses.
- ***Support NVMe, SAS, and SATA back-end storage protocols.*** Modern SDS block storage solutions strive to give organizations access to both the fastest and most economical storage options. To enable this functionality, they each support NVMe, SAS, and SATA back-end storage protocols to provide access to the widest range of HDDs and SSDs.

Differences between the TOP 5 Modern SDS Block Storage Solutions

Despite the multiple similarities between the DCIG TOP 5 Modern SDS Block Storage solutions, they also differ significantly in supported features. Since their differences outnumber their similarities, organizations should identify specific features the solution should possess to meet their data center requirements.

The differences between the DCIG TOP 5 Modern SDS Block Storage solutions primarily surface in the following five areas:

- ***Air-gapping.*** Air-gapping, which involves physically isolating a computer system or network from other networks, serves to protect against cyberattacks. Four of the TOP 5 Modern SDS Block storage vendors do support on-premises air gapping by using on-premises object-based private cloud storage. However, support for removable disk media and tape drives and libraries is available from at least one provider.
- ***Multi-tenancy.*** Many organizations require multitenancy for isolating storage for different business units. All the DCIG TOP 5 solutions offer additional forms of multitenancy beyond logical separation. These techniques include creating Virtual Private Clouds (VPCs), setting up dedicated storage drives per tenant, or through their organization's RBACs.

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All the DCIG TOP 5 solutions offer multiple forms of multi-tenancy beyond logical separation. These techniques include creating Virtual Private Clouds, setting up dedicated storage drives per tenant, or through their organization's role-based access controls.

- ***Predictive analytics.*** Predictive analytics use machine learning algorithms to analyze historical data and make predictions about how a system will behave. These analytics are popular among the TOP 5 SDS Block Storage products as they perform analytics in a variety of ways.

  Three of the five monitor their systems to provide proactive intervention and recommend configuration changes to optimize performance. Two also perform cross-stack analytics to identify whether the VM, physical host, network, storage, or some combination of them are causing issues. Some do capacity forecasting, and a few perform AI/ML either on the system or in the cloud.
- ***Quality-of-Service.*** Quality-of-Service (QoS) features ensure organizations can prioritize a minimum level of storage performance for critical applications. Absent QoS, demanding yet lower priority workloads, could consume resources needed by higher-priority applications and workloads. Most DCIG TOP 5 solutions include QoS though they implement it differently. All but one allows maximum levels, three support creating differ QoS levels, such as Gold, Silver, and Bronze, and two permit organizations to set QoS minimum levels.
- ***Publicly available, published performance numbers.*** The TOP 5 solutions represent a mix of newer providers and those that have been in business for multiple decades. As such, two of the more established ones publish performance benchmarks that reflect how well their solutions perform. These reports include insight into the system configuration that contributed to achieving these performance numbers and under what conditions.

TOP 5 Modern SDS Block Storage Solution Profiles

Each of the following DCIG TOP 5 Modern SDS Block Storage solution profiles highlights at least three ways they differentiate themselves from one another. These differentiators represent some of the primary reasons that an organization may want to consider one solution over another as a modern SDS block storage solution. Within each solution, an organization may find features that better meet its specific needs.

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StorPool specifically meets and exceeds performance expectations for Linux KVM VMs running in cloud environments.

StorPool Storage

StorPool Storage converts standard servers running Linux (RHEL, RHEL clones, Oracle Linux, Ubuntu, or Debian) into high-performance, linearly scalable storage systems. StorPool then pools the aggregate capacity and performance of the storage resources across these systems.

StorPool Storage utilizes a parallel, multi-node, shared-nothing architecture that scales to more than 60 petabytes of usable capacity per system. Its Linux-based architecture scales both capacity and compute asymmetrically and independently with support for NVMe SSDs to accelerate performance.

Additional features that helped StorPool Storage earn a DCIG TOP 5 award in Modern SDS Block Storage Solutions include:

- ***Cloud-first approach to system management.*** StorPool wrote its Storage software from scratch, designing it specifically for use in always-on cloud data centers. This approach equips organizations to perform all cloud management tasks using its APIs.

  Using StorPool's APIs, organizations can automate and centralize cloud-management tasks, set up self-service for end-users, and perform dynamic storage provisioning. These APIs also help organizations proactively schedule data movement to avoid downtime during patches, upgrades, and server refreshes.

- ***StorPool meets or exceeds performance expectations for Linux KVM VMs hosted in cloud environments.*** Organizations rightfully have concerns that using cloud block storage in lieu of standard storage systems will cause degraded performance. StorPool Storage addresses these concerns for VMs hosted on any hypervisor. However, StorPool specifically meets and exceeds performance expectations for Linux KVM VMs running in cloud environments.

  StorPool first implements its StorPool Block Protocol with its IP block storage driver on the Linux KVM VMs. It then deploys this software in conjunction with NVMe SSDs. Running this configuration on a 12-node cluster built on standard off-the-shelf Intel servers, StorPool achieved 13.8M IOPS in a performance test. Further, it achieved an average front-end latency of 0.4ms running under that load using no data caching or write buffering.[3]

- ***Offers a fully managed storage solution.*** SDS block providers have made multiple advancements to make their SDS block storage easier to install and manage. Despite these advancements, organizations sometimes still hesitate to move forward with SDS block storage solutions.

  To address those concerns, StorPool offers its own Fully Managed Storage Solution. Using this service, StorPool technical experts work with each organization to design a system specific to their needs. Once designed, StorPool deploys the system, monitors it, and fine tunes the performance.

  Its continuous maintenance includes patches, updates, and helping with hardware refreshes that it performs non-disruptively with no storage downtime requirements. Utilizing StorPool Analytics and StorPool Monitoring tools to deliver these managed services, these applications collect and process thousands of metrics per second per node.[4]

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LINBIT SDS goes well beyond supporting a container storage interface for persistent storage in Kubernetes. It focuses on making LINBIT SDS work seamlessly in cloud environments.

LINBIT SDS

LINBIT combines two software offerings to create its SDS solution tailored for private cloud infrastructure. It bases LINBIT SDS on both LINSTOR, LINBIT's open source SDS management, and Distributed Replicated Block Device (DRBD) open source software for Linux. Together as one, LINBIT SDS provides the DRBD Kernel Driver, Linstor Volume Manager, and a GUI for simplified multi-cluster management.

Features that helped LINBIT SDS earn a DCIG TOP 5 award in Modern SDS Block Storage Solutions include:

- ***DRBD provides high availability and performance for Linux-based storage.*** LINBIT originally developed DRBD in 2001 with DRBD officially integrated into the Linux Kernel in 2010. DRBD mirrors block devices between hosts, and works across any type of block device, such as hard drives, SSDs, partitions, RAID setups, and logical volumes. More than two decades old, DRBD regularly gets updated with bug fixes, performance improvements, and new features.

  LINSTOR complements DRBD, as LINBIT originally developed LINSTOR to manage DRBD resources. However, LINSTOR has matured, now often getting integrated with software stacks such as LINBIT SDS to provide persistent storage.

  Using LINBIT SDS, organizations may manage logical volumes, ZFS volumes, or both on a cluster of nodes. They can also replicate data between nodes and create block storage devices while obtaining access to snapshots, encryption, and caching.
- ***Designed and optimized for cloud deployments.*** LINBIT SDS goes well beyond supporting a container storage interface (CSI) for persistent storage in Kubernetes. It focuses on making LINBIT SDS work seamlessly in cloud environments.

  It comes with an Operator, helm charts, a kubectl plugin, an HA controller, and is compatible with KubeVirt. Further, it supports OpenShift, Rancher, MicroK8s and Nomad container platforms for persistent storage. That makes it fit well with cloud-native storage (CNS), also known as container-native storage.

  Organizations may integrate LINBIT SDS with multiple open-source platforms. These include Kubernetes, OpenShift, OpenNebula, OpenStack, Proxmox VE, Xen Orchestra and others.

  However, organizations can also host LINBIT SDS on traditional enterprise platforms. These include bare metal on-premises hardware, or on virtual machines (VMs), containers, clouds, or in hybrid environments. Organizations may also deploy it in all major general-purpose public clouds.
- ***Supports three different IP block-based storage protocols.*** DRBD represents LINBIT SDS' primary block storage protocol. However, LINBIT SDS also supports iSCSI and NVMe over TCP as block storage networking protocols.

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Nexustorage Nexfs contains a built-in data protection feature, SmartProtect, that continuously backs up changed data chunks. As changes occur to a volume, SmartProtect only needs to copy the chunks on the volume with changed data.

Nexustorage Nexfs

Launched in 2021 and based in New Zealand, Nexustorage represents a relative newcomer to the storage software provider marketplace. Its Nexfs SDS software offers universal storage. It supports block (iSCSI) and file (SMB/CIFS and NFS) storage networking protocols and S3-compatible object storage APIs.

Features that helped Nexustorage Nexfs earn a DCIG TOP 5 award in Modern SDS Block Storage Solutions include:

- ***Dynamically supports intelligent data placement across three storage tiers.*** Nexfs supports up to three storage tiers. It only requires Tier 1 storage for hot data typically using SSDs for this tier. It can also support two additional optional tiers. For example, it can use Tier 2 SATA HDDs for warm data and Tier 3 cloud or object storage for cold data.

  It first combines all available storage tiers into a single pool of storage. Nexfs then places variable-sized chunks of data across its managed storage tiers. Finally, Nexfs uses AI to intelligently place the data chunks across the available managed storage tiers. It places data chunks on the different tiers according to each data chunk's performance requirements.
- ***Continuous backups of changed data chunks.*** Nexustorage Nexfs contains a built-in data protection feature, SmartProtect, that continuously backs up changed data chunks. Nexfs stores block data at a granular chunk level with data chunks ranging in size from 512 bytes to 8 MB. As changes occur to a volume, SmartProtect only needs to copy the chunks on the volume with changed data.

  SmartProtect uses Nexfs' versioning technology to capture data changes using multiple techniques. It can record changes when:

  - A data chunk or chunks change.
  - On file close.
  - At a specified frequency for open files.
  - A combination of these events occurs.

  SmartProtect can use any S3-compatible storage, another Nexfs cluster or other Nexfs nodes within the same cluster as backup targets. Using this storage type positions organizations to secure their data and recover from ransomware attacks without requiring a third-party backup solution.
- ***Transparent subscription-based software licensing methodology.*** Nexustorage lists its annual subscription-based pricing on its website making it transparent to potential clients. Nexustorage licenses Nexfs based on the features needed and gross managed capacity with multiple licensing tiers.

  Those organizations wanting to trial Nexustorage may obtain a free Community Edition license with up to 5 TB of storage. Nexustorage prices Nexfs as follows:

  - Nexfs Basic includes a software license for 10 TB of managed capacity.
  - Nexfs Standard includes a license for 25TB of managed capacity.
  - Organizations may also obtain annual subscription-based licenses for 100 TB, 250 TB, 500 TB, and 1 PB.

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StoneFly strongly advocates for organizations to leverage air-gapping storage to protect against ransomware. To help them meet this need, StoneFly offers organizations three options to air-gap their data depending on their IT environment and requirements.

StoneFly StoneFusion

StoneFly StoneFusion's software-defined storage (SDS) converts bare metal servers into turnkey storage appliances. While this report focuses on StoneFly's block storage software, StoneFly also offers NAS (file) or AWS S3-compliant object storage appliances. Organizations may even obtain StoneFly as a cloud-based storage-as-a-service (STaaS).

Having shipped its SDS software for more than two decades, StoneFly claims to have more than 10,000 customers. Its 20+ years of delivering storage software has resulted in StoneFly delivering a feature-rich solution. Its software includes a wide range of storage optimization, data protection, and advanced monitoring features.

Additional features that helped StoneFly StoneFusion earn a DCIG TOP 5 award in Modern SDS Block Storage Solutions include:

- ***Comprehensive block storage protocol support.*** StoneFly represents one of the earliest storage software providers to offer and support the iSCSI storage networking block protocol in 2002. Since then, it has expanded its support of storage networking protocols to include Fibre Channel and InfiniBand.
- ***Multiple deployment options.*** StoneFly supports a wide range of deployment options for its SDS software. Organizations may deploy it in eight different ways, to include a (an):
    1. Compute-only cluster.
    2. Geo-dispersed cluster in separate locations.
    3. HCI cluster with storage and compute in the same node.
    4. Highly available disaggregated infrastructure
    5. Hybrid cloud with clusters on-premises and in general-purpose public clouds.
    6. Scale-out with multi-node support
    7. Single-data center deployment
    8. Storage-only cluster.
- ***Multiple options to air-gap storage.*** StoneFly strongly advocates for organizations to leverage air-gapping storage to protect against ransomware. Air-gapping isolates data and protects it in the event a ransomware attack compromises both an organization's production and offsite environments. StoneFly offers organizations three options to air-gap their data depending on their IT environment and requirements.
    1. ***Air-gapped repositories.*** Air-gapped repositories consist of a single controller connected to two target storage repositories. One target storage repository remains network-facing, always accessible, and available for use. The second storage repository gets air-gapped by being detached and isolated.
    2. ***Air-gapped controllers.*** Air-gapped controllers resemble the air-gapped repository design except that each repository has its own controller. In this case, one controller and its target storage repository remain network-facing, always accessible, and available for use. The second controller and its storage repository get air-gapped by being detached and isolated.
    3. ***Air-gapped nodes.*** Air-gapped nodes come as purpose-built appliances with network and power controllers. These nodes only attach and become visible when reading or writing data to them. When the reads or writes conclude, the controllers automatically detach isolating the appliances.

  In these three use cases, organizations may define policies that automatically attach/connect one repository, controller, or node and detach/disconnect the other.

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Delivering block storage with sub-millisecond performance times to virtual machines hosted in any cloud requires careful upfront planning and engineering. Zadara accomplishes this feat by placing its Storage Cloud in data centers with proximity to cloud providers.

Zadara Storage Cloud

Zadara helped to pioneer storage-as-a-service in 2012 by first offering its Storage Cloud to which AWS EC2 instances could connect. Since then, Zadara has made its Storage Cloud accessible to virtual machines running in other general-purpose and purpose-built clouds. Now organizations may obtain Zadara Storage Cloud with the hardware and software they need to host and run it on-premises.

Features that helped Zadara Block Storage earn a DCIG TOP 5 award in Modern SDS Block Storage Solutions include:

- ***Scale-out architecture that overcomes potential bottlenecks.*** Scale-out storage systems that share resources can sometimes cause internal CPU, network, and/or storage bottlenecks that may slow performance. To remedy this, Zadara uses a distributed, scale-out storage array architecture to create its Storage Cloud.

  Each Storage Cloud may consist of tens, hundreds, or potentially thousands of Virtual Private Storage Arrays (VPSAs). Each VPSA consists of two storage array controllers which is a pair of virtual machines configured in a failover cluster.

  Each controller pair gets assigned dedicated CPU pairs and disks across multiple server nodes to avoid oversubscription of these resources. Further, Zadara Storage Cloud supports 100Gb interconnects and iSCSI extensions for RDMA to create a low cost, low latency network fabric. Using this configuration, Zadara Cloud Storage isolates the workloads in each VPSA from the others to prevent unexpected performance bottlenecks.

- ***Eliminates the pain and overhead of data migrations.*** Any organization that has managed multiple storage arrays knows the headaches associated with data migrations. Any time they need to introduce a replacement of an end of life (EOL) array frequently requires migrating data off of it. To do so often incurs downtime, risk, and many man hours to accomplish.

  Zadara addresses this concern by automatically – and for the life of a Zadara Storage Cloud – replacing its cloud storage nodes. When a Zadara Storage Cloud storage node reaches EOL, Zadara ships the organization a new node. The Zadara Storage Cloud software then migrates the data from the EOL node to the new node without taking the system offline. Its software then shreds the data on the EOL node before the node gets returned to Zadara.

- ***Offers sub-millisecond iSCSI block storage networking connectivity to workloads hosted in many clouds.*** Delivering block storage with sub-millisecond performance times to virtual machines hosted in a cloud requires careful upfront planning and engineering. Zadara accomplishes this feat by placing its Storage Cloud in data centers with proximity to cloud providers. It then puts in place a high bandwidth Direct Connect from that data center to the cloud provider's data center. This enables Zadara to deliver block storage with sub-millisecond response times to virtual machines located in that cloud data center.

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Modern SDS Block Storage Solutions Inclusion Criteria

In considering the SDS block storage solutions for inclusion in this report, each one must meet the following criteria:

- Offers block storage virtualization software.
- Must support at one least block storage networking protocol, to include any of the following: Fibre Channel, Infiniband, iSCSI, NVMe-OF, NVMe/FC, or NVMe/TCP.
- May be available as software-only that runs on standard server hardware or select OEM server platforms.
- May be available as pre-integrated appliance that includes all needed hardware and software from two or more hardware providers..
- May be available as a virtual storage appliance available for deployment in the cloud, on-premises, or both.
- Shipping and available by September 1, 2024.
- Sufficient information available for DCIG to make an informed, defensible decision.

DCIG Disclosures

Providers of some of the SDS block storage solutions covered in this DCIG TOP 5 report are or have been DCIG clients. In that vein, there are some important facts to keep in mind when considering the information contained in this TOP 5 report:

- No provider paid DCIG a fee to research this topic or arrive at predetermined conclusions.
- DCIG did not guarantee any provider that its solution would be included in this TOP 5 report.
- DCIG did not imply or guarantee that a specific solution would receive a TOP 5 designation.
- All research is based upon publicly available information, information shared by the provider, and the expertise of those evaluating the information.
- DCIG conducted no hands-on testing to validate how or if the features worked as described.
- No negative inferences should be made against any provider or solution not covered in this TOP 5 report.
- It is a misuse of this TOP 5 report to compare solutions included in this report against solutions not included in it.

No provider was privy to how DCIG weighted individual features. In every case the provider only found out the rankings of its solution after the analysis was complete. To arrive at the TOP 5 solutions included in this report, DCIG went through a seven-step process to come to the most objective conclusions possible.

1. DCIG established which features would be evaluated.
2. The features were grouped into four general categories.
3. DCIG weighted each feature to establish a scoring rubric.

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4. DCIG identified solutions that met DCIG's definition for an SDS block storage solution.
5. A survey was completed for each SDS block storage solution.
6. DCIG evaluated each SDS block storage solution based on information gathered in its survey.
7. Solutions were ranked using standard scoring techniques. ■

Sources

1. https://www.precedenceresearch.com/software-defined-storage-market. https://www.statista.com/outlook/tmo/data-center/storage/worldwide#revenue. Referenced 10/2/2024.
2. https://news.broadcom.com/news/vmware-by-broadcom-business-transformation. Referenced 10/3/2024.
3. https://storpool.com/blog/the-iops-challenge-is-over-storpool-holds-the-new-world-record-13-8-mln-iops. Referenced 10/25/2024.
4. https://storpool.com/fully-managed-storage-fms-staas. https://storpool.com/products/data-storage#storpool-storage-platform. Referenced 10/19/2024.

About DCIG

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