DCIG

DCIG *TOP 5*
Enterprise Hybrid Cloud SDS Block Storage Solutions

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TOP 5 Enterprise Hybrid Cloud SDS Block Storage Solutions*

Veritas InfoScale
IBM Spectrum Virtualize
NetApp ONTAP Select & Cloud Services
Pure Cloud Block Store
VMware vSAN

* Licensing vendor is listed first; others listed in alphabetical order

SOLUTIONS EVALUATED:
- Commvault Hedvig Distributed Storage Platform
- DataCore SANsymphony
- Datera
- Dell PowerFlex OS
- Excelero NVMesh
- IBM Spectrum Virtualize
- iXsystems TrueNAS
- LINBIT SDS
- NetApp ONTAP Select & Cloud Services
- Open-E JovianDSS
- Pure Cloud Block Store
- Silk (formerly Kaminario)
- Starwind Virtual SAN
- Storidge Container IO
- StorMagic SvSAN
- StorONE S1 Enterprise Storage Platform
- StorPool Storage
- SUSE Enterprise Storage
- Tintri NexentaStor
- Veritas InfoScale
- VMware vSAN
- Zadara VPSA

SOLUTION FEATURES EVALUATED:
- Deployment Capabilities
- Data Protection
- Product and Performance Management
- Documentation
- Technical Support
- Licensing and Pricing

Software-defined Storage Factors Driving Adoption

The growth of Software-defined Storage (SDS) is part of a broader transition to the software-defined data center, where infrastructure elements such as compute, storage, and networking are abstracted and virtualized. Increasing SDS capabilities, along with the demand for flexibility and agility, fuels SDS demand. Trending at a compound growth rate of 27%, the SDS market expects to grow $42.79 billion by 2024.[1]

Factors contributing to the growth of SDS include:

Agility and optionality. Organizations can deploy and configure software-defined storage solutions where and how they want using their preferred server provider, which may differ from their preferred storage software vendor. Expanded deployment options open up within virtual and cloud platforms as SDS solutions free enterprises from particular hardware vendors and infrastructures.

Increasingly powerful hardware. Advances in underlying system hardware, including multicore CPUs, large amounts of RAM, flash memory, and fast networking, contribute to SDS growth. In many cases, these advances eliminate the need for specialized storage hardware, enabling ever-expanding storage capacity and consistent, low-latency performance.

Hybrid cloud environments. Cloud adoption and in particular, the embrace of hybrid cloud models stimulates expansion of SDS. Enterprise storage vendors now offer their solutions as software on servers of the customer's choice and on public cloud platforms. They provide enterprise-class data services with performance characteristics businesses need for confidence to move their workloads to these platforms.

Hybrid Cloud Shaping SDS Product Capabilities

Many organizations desire to move workloads to the cloud or make data available for processing in the cloud without sacrificing data services and integrations they rely on in their on-premise datacenters. Their hybrid cloud requirements are shaping SDS product capabilities.

Examples of this evolution:

1. *Deployment flexibility*. Enterprises deploy SDS solutions at the edge, in data centers, and within cloud platforms. Recognizing deployment environments better suit some purposes over others, enterprises move data to where workloads best reside. Thus, organizations look for SDS solutions with flexibility and adaptability to meet the unique needs of these diverse workloads.

2. *Cloud data snapshotting.* More than in the past, enterprises are snapshotting to the cloud. Organizations may use that data to recover applications on-premise, recover applications in the cloud, or extract value from that data by running cloud-based processes against it.

3. *Automation and predictive analytics.* Data generation, regardless of industry, continues to climb. As data's value diminishes with age, organizations require automation tools to speed processes with SDS products. Predictive analytic features become a differentiator as companies look to save time and money through insights and recommendations based on artificial intelligence and machine learning (AI/ML).

4. *Licensing and pricing.* Organizations look for flexibility in their SDS agreements. As contrasted with a traditional contract for an on-premise storage array and then repurchasing those capabilities for data stored in the cloud, companies want agreements that enable them to manage data wherever it lives. In response, solution providers are adapting their licensing and pricing models to accommodate hybrid cloud architectures.

> *"Predictive analytic features become a differentiator as companies look to save time and money through insights and recommendations based on artificial intelligence and machine learning (AI/ML)."*

SDS for Block Storage

The traditional storage area network (SAN) appliance has long been the trusted, shared platform for an enterprise's most valuable data. As SDS has moved mainstream, many enterprise storage vendors have made their solutions available as software-defined storage on-premises and in the cloud. Enterprises are comfortable extending trust to these SDS solutions for mission-critical workloads. In many cases, SDS solutions for hybrid cloud environments become a natural extension of the on-premise SAN. With these solutions, the tools and scripts to deploy and manage cloud data are the same as on-premise data management.

Distinguishing Features of TOP 5 SDS Enterprise Hybrid Cloud SDS Block Storage Solution Providers

DCIG evaluated twenty-two SDS solutions supporting block storage protocols. Using fact-based solution analysis and comparisons of defensible data derived from publicly available sources, vendors, and DCIG's own experience, DCIG's TOP 5 Enterprise Hybrid Cloud SDS Block Storage Solution providers evidenced these characteristics:

1. **Substantial revenues.** All DCIG TOP 5 SDS Block Storage solution providers have revenues approximate to or greater than $1 billion. These superior revenues reflect mature technical and support processes that instill confidence in deploying and using the product in enterprise settings.

2. **Robust support capabilities.** These TOP 5 solution providers display robust support capabilities compared to other solutions DCIG evaluated. They provide publicly available support documentation for big data applications such as Microsoft Structured Query Language (SQL), Oracle, and SAP HANA. All TOP 5 vendors hosted community forums and online knowledgebases for self-service support. They evidenced a greater breadth of technical support options in comparison with the other solutions.

> *"TOP 5 vendors evidenced a greater breadth of technical support options in comparison with other solutions."*

3. **Public cloud support.** The idea of enterprise hybrid cloud SDS block storage links the concept of on-premise SDS deployment with deployment in at least one public cloud. Large companies look to cloud services for storage expansion, rapid recovery, and running cloud-based workloads. All DCIG TOP 5 solution providers support deployment in at least two public cloud platforms, providing ample opportunities for linking enterprise storage to cloud data services.
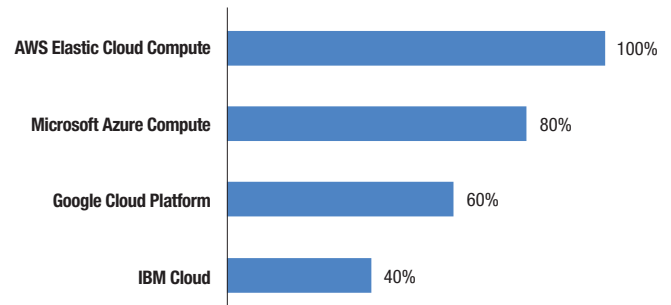
Similarities between the TOP 5 Enterprise Hybrid Cloud SDS Block Storage Solution Providers

In addition to the above characteristics that all DCIG TOP 5 Enterprise Hybrid Cloud SDS Block Storage solutions generally share, the solutions have these product traits in common.

These include:

- **Amazon Web Services (AWS).** All TOP 5 products support product deployment within AWS Elastic Cloud Compute (EC2). All five also support Amazon Simple Storage Service (S3) as a storage target. For context, only half the solutions evaluated support AWS EC2 for deployment or S3 as a target.

Supported Public Cloud Deployment Environments

Environment	Percentage
AWS Elastic Cloud Compute	100%
Microsoft Azure Compute	80%
Google Cloud Platform	60%
IBM Cloud	40%

- **Encryption.** Data encryption is understandably important to enterprise customers. The financial, legal, and brand reputation cost of data leaks and breaches is well-known. All TOP 5 solutions provide support for array-based encryption and data-at-rest encryption. All solutions support Advanced Encryption Standard (AES)-256 encryption standards. Again, contrasted with the remaining solutions, where only half of the products support these features.

- **Predictive analytics.** Predictive analytics has grown beyond supporting availability through avoiding failures to enabling the greatest value for dollars spent by optimizing performance. All TOP 5 products support predictive analytics for optimized data management. Of the twelve different analytic capabilities DCIG asked of each company, TOP 5 solution providers average between six and eight features they support. Every provider includes support for AI/ML within the deployment. Most include support for AI/ML based on the entire base of customers. Support for predictive analytics among the other products was notably less. For example, only two of the remaining seventeen solutions support predictive AI/ML analytics.

- **Management integrations.** Enterprise customers need products that integrate well with their current technology and infrastructure. DCIG identified more than a dozen different ways an enterprise can manage an SDS product. All TOP 5 solutions support at least seven of these management options. These capabilities support flexibility for how organizations use technology to run their business.

The TOP 5 solutions also deliver on the following product features:

- Application performance management through Quality-of-Service priorities
- Broad client operating system support including Microsoft, VMware, and common distributions of Linux
- Active Directory (AD) and Light Directory Access Protocol (LDAP) integration
- Data optimization features such as data compression
- Broad support for VMware integration
- Synchronous replication for high availability

Differences between the TOP 5 Enterprise Hybrid Cloud SDS Block Storage Solutions

The TOP 5 solutions differ from one another in the following ways:

- *Public cloud support.* While all TOP 5 solution providers support at least two public clouds and all supported AWS, other cloud deployment options show mixed support. Some providers offered deployment in their own public cloud. Solution providers also vary in their support for bare-metal installations within cloud provider centers.

- *Additional deployment options.* Many of the TOP 5 providers offer options beyond on-premise and cloud-provider deployments. These options include offerings as a pre-integrated, preconfigured, hardware appliance with their SDS solution installed. Several providers offer storage-as-a-service on-premises and as managed cloud volumes.

- *In-flight encryption support.* While all TOP 5 solution providers support array-based encryption and at-rest encryption, only three of five products indicate support for in-flight encryption. Where regulatory or special circumstances require additional encryption support, enterprises should consider the full depth of encryption features a solution supports.

- *3rd Party SAN integration.* The ability to integrate existing SAN storage brings legacy storage into the SDS management domain. This adds hybrid cloud capabilities to existing storage systems, facilitates data migrations, and enables legacy arrays to function as a storage tier. Most of the TOP 5 solutions support third-party SAN array integration, as contrasted with approximately half the remaining evaluated solutions.

- *Kubernetes support.* Kubernetes is a notable driver in the SDS market. A recent survey by the Cloud Native Computing Foundation survey indicates 78% of respondents use Kubernetes in production.[2] Most of the TOP 5 solutions provide CSI plugins enabling persistent storage for container-based workloads.

Top 5 Enterprise Hybrid Cloud SDS Block Storage Solution Profiles

Each of the DCIG TOP 5 Enterprise Hybrid Cloud Block Storage Solution Profiles highlights three notable solution features that make the product attractive to enterprises.

Veritas InfoScale

InfoScale Enterprise, previously known as the Storage Foundation suite of products, is Veritas's SDS offering that combines InfoScale's storage and availability products into an integrated enterprise solution. In its third iteration, organizations may deploy it on physical, virtual, or major cloud platforms.

Three ways Veritas InfoScale differentiates itself from the other DCIG TOP 5 Enterprise Hybrid Cloud SDS Block Storage solutions include:

- **Application resiliency.** InfoScale embeds a high availability engine that manages and monitors business-critical applications for availability and performance. The Veritas solution monitors applications based on the underlying platform (physical, virtual, or cloud) plus the data it needs to access wherever it resides (e.g., DAS/NAS/SAN, S3/EBS/Blob). InfoScale provides organizations event-based application monitoring, automated remediations (e.g., application restarts), and orchestrates high availability and disaster recovery. These features help ensure service level objectives are met and exceeded for critical applications.

- **Performance maximization.** Legacy storage such as traditional SAN arrays supporting tier 1 applications can become a bottleneck through network and storage array limitations. Veritas SmartIO caching utilizes in-server SSDs for frequently accessed data for faster application performance. Through Flexible Storage Sharing (FSS), InfoScale leverages server attached flash storage to share it across all local cluster nodes for performance gains over legacy array storage. InfoScale's SmartTier feature can dynamically move data based on I/O activity patterns to preferred tiers such as SSDs, HDDs, and cloud storage. This keeps the most active data local for fast access.

- **Deployment flexibility.** InfoScale provides broad deployment capabilities by running on a wide variety of operating systems and physical, virtual, and cloud platforms. InfoScale supports mission-critical applications from UNIX to Linux and Windows running on physical servers, multiple forms of virtualization, cloud deployments, and containers. Regardless of the underlying platform or operating system environment, InfoScale helps manage complex storage infrastructures while also delivering high application availability and performance.

IBM Spectrum Virtualize

IBM represents a well-known name in computing and storage products and services. The IBM Spectrum Storage suite of products supports a wide range of SDS capabilities. Spectrum Virtualize™, a member of this software product family, targets block data storage uses. IBM makes Spectrum Virtualize available pre-integrated on IBM FlashSystem and SAN Volume Controller (SVC) storage systems, in the IBM public cloud, or in AWS.

Three of the key features that earned IBM Spectrum Virtualize a spot among DCIG TOP 5 Enterprise Hybrid Cloud SDS Block Storage System solutions include:

- **IBM Cloud®.** Spectrum Virtualize brings the benefit of deploying on IBM's owned and managed public cloud platform. IBM Cloud contains over 170 products covering data, containers, AI, IoT, and blockchain applications. IBM Cloud supports both virtualized and containerized workloads. Enterprises accelerate AI adoption through IBM's portfolio of pre-built applications, tools, and runtimes with IBM Watson. IBM Cloud Pak® for Data supports AI data use cases through a cloud-native data and AI platform. Within IBM Cloud, IBM Spectrum Virtualize runs on bare metal servers bringing hybrid cloud benefits such as data mirroring, tiering, recovery, and consistent storage function between on-premises and the cloud.

- **Comprehensive storage virtualization.** Unique among the other solution providers, IBM's block SDS capabilities support integration and virtualization of over 500 storage systems. Enterprises benefit through obvious cost savings when pooling existing storage systems. Spectrum Virtualize extends enterprise data services, such as auto-tiering, encryption, and hybrid cloud functionality to this legacy storage; thus, modernizing this storage with improved performance, security, administration, and new use-cases.

- **Accelerate AI adoption.** Enterprise organizations look to differentiate themselves through AI/ML. IBM ranks #1 in AI market share and supports some of the world's largest and leading-edge AI/ML applications today.[3] IBM views the journey to AI as a ladder: 'There is no AI without IA (Information Architecture).'[4] This ladder architecture reflects how information is collected, organized, analyzed, and infused. IBM optimizes Spectrum Virtualize for AI/ML use cases with this frame of reference. Organizations leverage their data and the insights this data brings when combined with IBM's suite of compute, storage, and cloud platform offerings designed for AI, big data, and analytic workloads.

NetApp ONTAP Select & Cloud Services

NetApp® has transformed itself from a data storage appliance company to a provider of cloud data services, storage systems, and software. NetApp uses data fabric to describe data services spanning the edge, core, and cloud.[5] Installed on their preferred server vendor, organizations can use NetApp's ONTAP Select as their SDS solution to manage their hybrid cloud environment. NetApp offers its SDS product on leading cloud providers as NetApp Cloud Volumes ONTAP and NetApp Cloud Volumes Service.

Three highlights the NetApp ONTAP brings as a DCIG TOP 5 Enterprise Hybrid Cloud SDS Block Storage solution include:

- **Multi-cloud support.** NetApp Cloud Volumes ONTAP deploys to the AWS, Azure, Google, and IBM clouds. Each cloud provider offers NetApp's solution on its marketplace for accelerated deployment and configuration. The Cloud Volumes ONTAP dashboard displays infrastructure health across multiple cloud accounts. Integrated with NetApp Cloud Manager, it delivers management tools for automation and orchestration. This breadth of cloud provider support opens rich possibilities for hybrid cloud and multi-cloud solutions.

- **Metroclustering.** ONTAP MetroCluster™ SDS stretches and splits the internode connection of ONTAP Select from 200 meters to 10 kilometers for campus and metropolitan computing environments. ONTAP Metrocluster SDS supports synchronous data replication for continuous data availability and automatic failover. This enables recovery from unplanned events such as local fire, floods, or power outages.

- **Ruggedized deployments.** Edge environments may challenge computing equipment with exposure to the sun, rain, and dust and bring unique design requirements accounting for space, power, and network connectivity. NetApp partners with select technology manufacturers to create ruggedized appliances with the ONTAP storage operating system. These appliances possess form factors protecting them from element hazards such as heat, moisture, and vibration. Technology partners design this equipment for atypical power supplies, limited network connectivity, and constrained space requirements. These options extend hybrid cloud solutions to harsh edge environments.

Pure Cloud Block Store

Pure Storage started as an all-flash array company, introducing its flagship FlashArray product as primary storage for enterprise data centers. In 2018, Pure Storage launched Pure Cloud Block Store™. Pure Cloud Block Store runs the same Purity Operating Environment as its on-premise FlashArray storage arrays. The solution supports virtual machine (VM) deployments within AWS and Microsoft Azure. It integrates with on-premise FlashArray implementations and as a managed service through Pure as-a-Service™.

Notable features that earned Pure Cloud Block Store a place among the other DCIG TOP 5 Enterprise Hybrid Cloud Block SDS solutions include:

- **Stateless controllers plus virtual shelf architecture delivers high availability.** Pure Storage differs substantively on how it architects cloud volumes. First, it deploys stateless active/active controllers as a pair of EC2 instances. Second, it creates a virtual storage shelf consisting of seven EC2 instances, each functioning as a virtual drive. If a virtual drive fails, the virtual shelf remains online. Storage can expand non-disruptively by adding more virtual storage shelves. Further, Pure Cloud Block Store mirrors all data to Amazon S3 for durability. Pure Storage built Cloud Block Store for the Azure platform with these same principles.

- **Proactive support.** Pure Cloud Block Store includes the Pure1® META analytics platform for data storage management and monitoring.

The analytics engine includes AI/ML recommendations based on both the customer's deployment and Pure's entire customer base. Pure Storage offers proactive resolution based on both fault data and predictive analytics. Pure Cloud Block Store's analytic and proactive support features reduce management overhead and increase system availability and performance.

- **Enterprise Hybrid Cloud SDS-as-a-Service.** Pure-as-a-Service and Pure Cloud Block Store are both available on AWS Marketplace and on-premises as a pay-per-GB-used model. Designed as a 100% OPEX subscription model, Pure-as-a-Service requires a minimum contract term of twelve months and a 50 tebibyte reserve capacity commitment. Backed by Pure's Cloud Efficiency Guarantee, organizations can experience notable data reductions through data compression, deduplication, and thin provisioning, depending on the workload and application. The service includes access to Pure1 META tools for managing the hybrid cloud storage environment from a single dashboard.

VMware vSAN

VMware enjoys wide enterprise adoption of its virtualization software. vSAN, VMware's enterprise-class, SDS solution, enables storage needs to be provided and configured on a per VM or VMDK basis. vSAN runs natively in-kernel as part of the ESXi hypervisor running on standard x86 servers, aggregating local or direct-attached storage across all hosts in a vSAN cluster. Through VMware Cloud Foundation, organizations can deploy VMware vSphere, and therefore vSAN, on leading cloud providers.

Three advantages VMware vSAN offers as a DCIG TOP 5 Enterprise Hybrid Cloud SDS Block Storage Solution include:

- **Simplified vSphere integration.** vSAN natively integrates with vSphere as an additional license. While other SDS products are certified for vSphere, there is an edge for vSAN. Administrators require no secondary management tool or software to administer vSAN. It is all found in the same vSphere web user interface. vSAN minimally impacts CPU and memory because of its vSphere integration. One provider takes responsibility, minimizing finger-pointing in problem or performance management issues.

- **Accelerated operations from Storage Policy Based Management (SPBM).** SPBM removes the chore of provisioning and maintaining LUNs, volumes, and data storage for virtual machines. Through policies defining availability and performance characteristics, SPBM manages data storage services within vSAN. Departments can assign and automate storage policies, including deduplication, compression, and software-based encryption to individual virtual machines or VMDKs. SPBM organizations can pre-define storage needs for services, applications, and business units. As business needs change, administrators can adjust policies quickly.

- **Large hybrid cloud ecosystem with VMware Cloud Provider partners.** In addition to VMware availability on leading public cloud providers, VMware Cloud Foundation is deployed on hundreds of VMware Cloud Verified partners such as community cloud providers and regional managed service providers. The VMware Cloud Verified badge identifies validated cloud partners delivering VMware's compute, storage, and network virtualization products as part of their cloud services. VMware Cloud Provider partners offer the ability to connect applications and data services across public and private clouds. Many of these partners bring specific industry expertise to businesses looking for hybrid and multi-cloud solutions.

Inclusion and Evaluation Criteria for Enterprise Hybrid Cloud SDS Block Storage Solutions

In this report, DCIG specifically focused on enterprise hybrid cloud SDS block storage solutions possessing the following characteristics. DCIG identified twenty-two different solutions meeting these inclusion criteria:

- Commercially available, SDS solution available on September 1st, 2020.
- Sufficient, publicly available information available for DCIG to make an informed decision.
- The product may be available as a pre-integrated software and hardware appliance from the solution provider.
- If available as a pre-integrated appliance, the product must also be available as a stand-alone software that can be installed on hardware from other providers or run in the cloud.
- At a minimum, supports iSCSI or Fibre Channel block storage protocols.

DCIG evaluated each of these solutions in the following areas:

1. *Deployment capabilities.* Evaluate the capabilities concerning on-premise deployment options, cloud provider deployment options, cloud provider targets supported, storage protocols supported, virtual environments supported, and certifications with equipment, operating systems, and applications.

2. *Data protection capabilities.* Evaluate solution capabilities supporting availability, encryption, replication, and snapshot features.

3. *Product and performance management features.* Evaluate options to manage the underlying hardware and optimize it for performance. Examples include dashboard views, predictive analytics, storage optimization, quality of service features, auto-tiering capabilities, and directory service integration.

4. *Documentation.* Evaluate the breadth and depth of documentation the provider makes available to customers. Examples include whitepapers, knowledgebases, online manuals, as well as community forums.

5. *Technical support.* Evaluate the availability and technical support options of the solution provider. Examples include support availability, response time commitments, options to open cases, escalation support, and proactive problem resolution.

6. *Licensing and pricing.* Evaluate the relative ease of doing business through flexibility and simplicity in contract lengths, pricing elements, and bundled pricing options.

DCIG Disclosures

Vendors of some of the solutions covered in this DCIG TOP 5 report are or have been DCIG clients. This is not to imply that their solution was given preferential treatment in this report. In that vein, there are some important facts to keep in mind when considering the information contained in this TOP 5 report and its merit.

- No vendor paid DCIG any fee to research this topic or arrive at predetermined conclusions.
- DCIG did not guarantee any vendor 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 provided by the vendor, and/or 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 drawn against any vendor 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.

DCIG wants to emphasize that no vendor was privy to how DCIG weighted individual features. In every case the vendor 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 six general categories.

3. A DCIG analyst internally examined the feature data for each solution and completed a survey for it based upon the analyst's own knowledge of the solution and publicly available information.

4. DCIG identified solutions that met DCIG's definition for an Enterprise Hybrid Cloud SDS Block Storage solution.

5. DCIG weighted each feature to establish a scoring rubric.

6. DCIG evaluated each solution based on information gathered in its survey.

7. Solutions were ranked using standard scoring techniques. ■

Notes

1. https://www.globenewswire.com/news-release/2020/07/14/2061718/0/en/Worldwide-Software-Defined-Storage-Industry-to-2024-Key-Drivers-Challenges-and-Trends.html. Accessed December 29th, 2020
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About DCIG

DCIG, the Data Center Intelligence Group, empowers the information technology industry with actionable analysis. DCIG provides informed third-party analysis of various cloud, data protection, and data storage technologies. Learn more at **www.dcig.com.**

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