DCIG 2017-18 All-flash Array Buyer's Guide Now Available

DCIG is pleased to announce the availability of the *DCIG 2017-18 All-flash Array Buyer's Guide* developed from the enterprise storage array body of research.

The *DCIG 2017-18 All-flash Array Buyer's Guide* weights, scores and ranks more than 100 features of twenty-five (25) products from twelve (12) different storage vendors. Using ranking categories of *Recommended*, *Excellent* and *Good* this Buyer's Guide offers much of the information an organization should need to make a highly-informed decision as to which all-flash storage array will suit their needs.

Each array included in the *DCIG 2017-18 All-flash Array Buyer's Guide* had to meet the following criteria:

- Must be available as an appliance that is available as a single SKU and includes its own hardware and software.
- Must be marketed as an all-flash array (AFA). The best evidence of meeting this criterion is the existence of a specific all-flash SKU.
- Must use flash memory as primary storage, not merely as an extended cache.
- May permit storage expansion with disk shelves that contain HDDs or the virtualization of external disk-based arrays—essentially converting the all-flash array into a hybrid storage array.
- Must support one or more of the following storage networking protocols: iSCSI, Fibre Channel, InfiniBand, NFS.
- There must be sufficient information available to DCIG to make meaningful decisions. DCIG makes a good faith effort to reach out and obtain information from as many storage providers as possible. However, products may be

excluded because of a lack of sufficient reliable data.

- Must be formally announced and/or generally available for purchase as of February 28, 2017.

DCIG's succinct analysis provides insight into the state of the all-flash storage array marketplace. The Buyer's Guide identifies the specific benefits organizations can expect to achieve using an all-flash storage array and key features organizations should be aware of as they evaluate products. It also provides brief observations about the distinctive features of each product. Ranking tables enable organizations to get an "at-a-glance" overview of the products; while DCIG's standardized one-page data sheets facilitate side-by-side comparisons assisting organizations to quickly create a short list of products that may meet their requirements.

End users [registering](#) to access this report via the [DCIG Competitive Intelligence Portal](#) also gain access to the DCIG Interactive Buyer's Guide (IBG). The IBG enables organizations take the next step in the product selection process by generating custom reports, including comprehensive side-by-side feature comparisons of the products in which the organization is most interested.

DCIG 2016-17 Midrange Unified Storage Array Buyer's Guide Now Available

DCIG is pleased to announce the availability of the *DCIG 2016-17 Midrange Unified Storage Array Buyer's Guide* developed from the enterprise storage array body of research.

The *DCIG 2016-17 Midrange Unified Storage Array Buyer's Guide* weights, scores and ranks more than 100 features of twenty-three (23) products from eight (8) different storage vendors. Using ranking categories of *Best-in-Class*, *Recommended* and *Excellent*, this Buyer's Guide offers much of the information an organization should need to make a highly informed decision as to which high end storage array will suit their needs.

Each array included in the *DCIG 2016-17 Midrange Unified Storage Array Buyer's Guide* had to meet the following criteria:

- Must be available as an appliance that includes its own hardware and software
- Must support one or more block-based (SAN) storage protocols: Fibre Channel, FCoE, or iSCSI
- Must support one or more file-based (NAS) storage protocols: CIFS/SMB or NFS protocols
- Must support scaling to at least two controllers
- Must be formally announced and/or generally available for purchase as of July 1, 2016

DCIG's succinct analysis provides insight into the state of the midrange unified storage array marketplace. The Buyer's Guide identifies the specific benefits organizations can expect to achieve using a midrange unified storage array and key features organizations should be aware of as they evaluate products. It also provides brief observations about the distinctive features of each product. Ranking tables enable organizations to get an "at-a-glance" overview of the products; while DCIG's standardized one-page data sheets facilitate side-by-side comparisons assisting organizations to quickly create a short list of products that may meet their requirements.

End users [registering](#) to access this report via the [DCIG Analysis Portal](#) also gain access to the DCIG Interactive

Buyer's Guide (IBG). The IBG enables organizations take the next step in the product selection process by generating custom reports, including comprehensive side-by-side feature comparisons of the products in which the organization is most interested.

DCIG 2015-16 Sub-100TB All-Flash Array Buyer's Guide Now Available

DCIG is pleased to announce the November 17 release of the **DCIG 2015-16 Sub-100TB All-Flash Array Buyer's Guide** that weights, scores and ranks more than 100 features of thirteen (13) arrays from six (6) different storage providers. Using ranking categories of Best-in-Class, Recommended, Excellent, Good and Basic this 42-page Buyer's Guide offers all of the information an organization should need to make a highly informed decision as to which all-flash arrays will suit their

needs.

This snapshot of the AFA marketplace focuses in on arrays with a maximum scale-up or scale-out capacity of less than 100TB. The AFA's in this guide have lower maximum capacities than some AFA's, but small capacity does not equate to low

performance. In fact, most of the arrays in this Buyer's Guide are from the flash storage startups and are focused on exploiting the low latency possibilities of flash for maximum acceleration of critical workloads.

DCIG's succinct analysis provides insight into the state of the all-flash array (AFA) marketplace, identifies the significant benefits organizations should look to achieve through an AFA implementation, identifies key features organizations should be aware of as they evaluate AFA's and provides brief observations about the distinctive features of each array. Ranking tables enable end users to get an "at-a-glance" overview of the AFA marketplace; and DCIG's standardized one-page data sheets facilitate side-by-side comparisons that enable organizations to quickly get to a short list of products that may meet their requirements.

Registration to access this report via the DCIG Analysis Portal also includes access to the DCIG Interactive Buyer's Guides (IBG). The IBG enables organizations take the next step in the product selection process by generating custom reports, including comprehensive side-by-side feature comparisons of the arrays in which the organization is most interested. Both the IBG and this Buyer's Guide may be accessed after [registering](#) for the [DCIG Analysis Portal](#).

DCIG 2015-16 Sub-250TB All-Flash Array Buyer's Guide Now Available

DCIG is pleased to announce the November 17 release of the **DCIG 2015-16 Sub-250TB All-Flash Array Buyer's Guide** that

weights, scores and ranks more than 100 features of nineteen (19) arrays from ten (10) different storage providers. Using ranking categories of Best-in-Class, Recommended, Excellent, Good and Basic this 49 page Buyer's Guide offers all of the information an organization should need to make a highly informed decision as to which all-flash arrays will suit their needs.

This snapshot of the AFA marketplace focuses in on arrays with a maximum scale-up or scale-out capacity of less than 250TB. The AFA's in this guide have lower maximum capacities than some AFA's, but small capacity does not equate to low performance. In fact, most of the arrays in this Buyer's Guide are from the flash storage startups and are focused on exploiting the low latency possibilities of flash for maximum acceleration of critical workloads.

DCIG's succinct analysis provides insight into the state of the all-flash array (AFA) marketplace, identifies the significant benefits organizations should look to achieve through an AFA implementation, identifies key features organizations should be aware of as they evaluate AFA's and provides brief observations about the distinctive features of each array. Ranking tables enable end users to get an "at-a-glance" overview of the AFA marketplace; and DCIG's standardized one-page data sheets facilitate side-by-side comparisons that enable organizations to quickly get to a short list of products that may meet their requirements.

Registration to access this report via the DCIG Analysis

Portal also includes access to the DCIG Interactive Buyer's Guides (IBG). The IBG enables organizations take the next step in the product selection process by generating custom reports, including comprehensive side-by-side feature comparisons of the arrays in which the organization is most interested. Both the IBG and this Buyer's Guide may be accessed after [registering](#) for the [DCIG Analysis Portal](#).

DCIG 2015-16 All-Flash Array Buyer's Guide Now Available

DCIG is pleased to announce the September 29 release of the *DCIG 2015-16 All-Flash Array Buyer's Guide* that weights, scores and ranks more than 100 features of twenty-eight (28) all-flash arrays or array series from eighteen (18) enterprise storage providers.

The marketplace for all-flash arrays is both rapidly growing and highly competitive. Many changes have taken place in the all-flash array marketplace in the 18 months since the release of the *DCIG 2014-15 Flash Memory Storage Array Buyer's Guide* in March of 2014. We have witnessed substantial increases in

capacity, storage density and performance. Over this same period, AFA's have established a track record of dramatic application acceleration and proven reliability.

All-Flash Arrays Now Replacing Traditional Enterprise Arrays in Mainstream Businesses

When we prepared the previous edition of this Buyer's Guide, multiple vendors indicated that prospective customers were looking to move to an all-flash environment for their critical business applications. These same vendors report that enterprises are now looking to use flash memory not just for critical applications, but for *all active workloads* in the data center. In a recent study[1] by 451 Research, 22% of respondents have already implemented an all-flash array. Of those, 57% were using the array to speed up multiple applications and 26% had fully replaced legacy arrays.

The return on investment (ROI) of using flash for all active workloads already made sense in 2014; and subsequent improvements in all-flash performance and flash prices make the ROI of moving to all-flash storage compelling. As a result, organizations will increasingly underline replace primary enterprise storage systems with all-flash arrays. The *DCIG 2015-16 All-Flash Array Buyer's Guide* will help those organizations accelerate the all-flash array selection process.

Enterprises wanting to change storage vendors will discover a robust and competitive marketplace. Multiple vendors have created new storage architectures designed from the ground up for flash memory and have created new expectations around ease-of-use and analytics-based proactive support.

Enterprises that are generally happy with their current storage vendor and storage system (performance issues aside) are likely to find an all-flash version of the storage system is available. Such businesses can realize some or all of the

benefits of an AFA without the risk associated with migrating to a new storage architecture, and without having to re-implement data protection strategies.

A Systemic Opportunity to Speed Up the Business

The purchase of an all-flash array (AFA) is most easily justified and will have the greatest benefit if approached as a systemic data center and business opportunity. Organizations taking this approach may discover that "flash is free". That is, the return on investment within the IT budget is rapid, and accelerating all enterprise applications creates the opportunity to reduce costs and increase opportunities across the entire business. As Eric Pearson, the CIO of InterContinental Hotels Group was quoted in Pat Gelsinger's VMworld 2015 keynote, *"It's no longer the big beating the small. It's the fast beating the slow."*[2]

Who's Who of All-Flash Array Providers

Vendors with products included in this guide are AMI, Dell, EMC, Fujitsu, Hitachi Data Systems, HP, Huawei, IBM, iXsystems, Kaminario, NetApp, Nimbus Data, Oracle, Pure Storage, SolidFire, Tegile, Violin Memory and X-IO Technologies.

The *DCIG 2015-16 All-Flash Array Buyer's Guide* top 10 solutions include (in alphabetical order):

- AMI StorTrends 3600i Series
- Dell Compellent SC8000
- HP 3PAR StoreServ 20000 Series
- HP 3PAR StoreServ 7000c Series
- Hitachi Data Systems HUS VM
- IBM FlashSystem V9000
- NetApp AFF8000 Series
- Pure Storage FlashArray//m Series
- SolidFire SF Series

- Tegile IntelliFlash T3000 Series

The [HP 3PAR StoreServ 20000 Series](#) earned the *Best-in-Class* ranking among all all-flash arrays evaluated in this Buyer's Guide. The HP 3PAR StoreServ 20000 Series stood out by offering the following capabilities:

- Achieved the *Best-in-Class* rank in 3 out of 4 categories; meaning it has the most comprehensive set of features expected of a primary enterprise storage array
- Multi-protocol SAN, NAS and object access, with support for data migration to OpenStack-based clouds; meaning it can handle any workload
- Provides up to 46 TB raw flash capacity per rack unit (TB/U) making it one of the highest density arrays in this guide
- Robust VMware and Microsoft technology support including VMware VVols and Microsoft SCVMM, ODX and SMB3

About the *DCIG 2015-16 All-Flash Array Buyer's Guide*

DCIG creates Buyer's Guides in order to help end users accelerate the product research and selection process; driving cost out of the research process while simultaneously increasing confidence in the results.

The *DCIG 2015-16 All-Flash Array Buyer's Guide* achieves the following objectives:

- Provides an objective, third party evaluation of products that evaluates features *from an end user's perspective*
- Provides insight into the state of the all-flash array (AFA) marketplace
- Identifies the significant benefits organizations should look to achieve through an AFA implementation
- Identifies key features organizations should be aware of as they evaluate AFA's
- Provides brief observations about the distinctive

features of each array

- Ranks each array in each ranking category and presents the results in easy to understand ranking tables that enable organizations to get an "at-a-glance" overview of the AFA marketplace
- Provides a *standardized one-page data sheet* for each array so organizations may quickly do side-by-side product comparisons that enable organizations to quickly get to a short list of products that may meet their requirements.
- Provides a solid foundation for getting competitive bids from different providers that are based on "apples-to-apples" comparisons

The *DCIG 2015-16 All-Flash Array Buyer's Guide* is available immediately to subscribing users of the DCIG Analysis Portal. Individuals who have not yet subscribed to the DCIG Analysis Portal may test drive the DCIG Analysis Portal as well as download this Guide by following this link.

[1] Coulter, Marco. "Flash Storage Outlook." Proc. of Flash Memory Summit 2015, Santa Clara, CA. Flash Memory Summit, 12 Aug. 2015. Web. 28 Aug. 2015. <https://www.flashmemorysummit.com/English/Collaterals/Proceedings/2015/20150812_S203D_Coulter.pdf>.

[2] *Pat Gelsinger on Stage at VMworld 2015, 15:50*. *YouTube*. YouTube, 01 Sept. 2015. <https://www.youtube.com/watch?v=U6aF00M0bZA&list=PLeFlCmVOq6yt484cUB6N4LhXZnOso5VC7&index=3>.

DCIG 2015-16 Hybrid Storage Array Buyer's Guide Now Available

DCIG is pleased to announce the availability of its **2015-16 Hybrid Storage Array Buyer's Guide** that evaluates and ranks more than ninety (90) features of fifty-nine (59) hybrid storage arrays from eighteen (18) different providers.
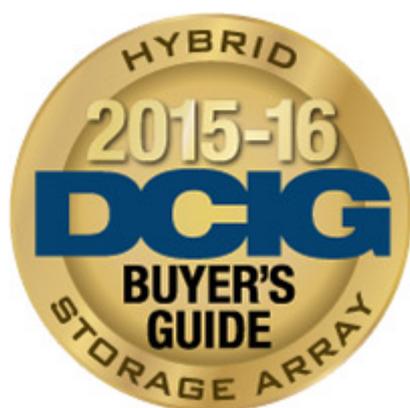
DCIG defines a Hybrid Storage Array as a physical storage appliance that dynamically places data in a storage pool that combines flash memory and HDD storage resources (and in some cases NVRAM and/or DRAM) by intelligently caching data and metadata and/or by automatically moving data from one performance tier to another.

DCIG's goal in preparing this guide is to evaluate and rank each solution based upon a comprehensive list of features that reflects the needs of the widest range of organizations. The Buyer's Guide rankings enable "at-a-glance" comparisons between many different models, and its standardized data sheets facilitate side-by-side reviews to quickly enable organizations to examine products in greater detail.

The DCIG 2015-16 Hybrid Storage Array Buyer's Guide covers models from the following storage providers (in alphabetical order):

- AMI
- Dell
- Dot Hill
- EMC
- Fujitsu
- HDS
- HP
- IBM
- Imation Nexsan
- iXsystems
- NetApp
- NexGen Storage
- Nimble Storage
- Oracle
- Tegile
- Tintri
- Winchester Systems
- X-IO Technologies

About the DCIG 2015-16 Hybrid Storage Array Buyer's Guide

DCIG creates Buyer's Guides in order to help end users accelerate the product research and selection process—driving cost out of the research process while simultaneously increasing confidence in the results.
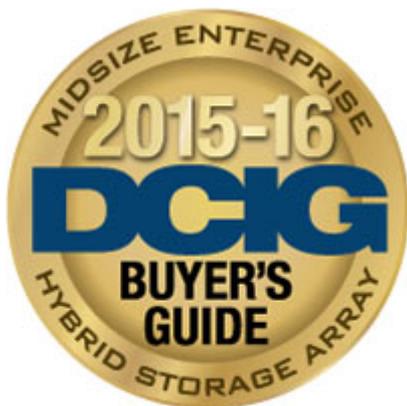
The DCIG 2015-16 Hybrid Storage Array Buyer's Guide achieves the following objectives:

- Provides an objective, third party evaluation of products that evaluates their features *from an end user's perspective*
- Ranks each array in each ranking category
- Provides a *standardized data sheet* for each of the arrays so organizations may quickly do side-by-side product comparisons
- Provides insights into what features the arrays offer to optimize integration into virtualization environments

- Provides a solid foundation for getting competitive bids from different providers that are based on "apples-to-apples" comparisons

The DCIG 2015-16 Hybrid Storage Array Buyer's Guide is available immediately to subscribing users of the [DCIG Analysis Portal](#). Individuals who have not yet subscribed to the DCIG Analysis Portal may test drive the DCIG Analysis Portal as well as download this Guide by following this [link](#).

DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide Now Available

DCIG is pleased to announce the release of the **DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide** that weights, scores and ranks more than 90 features of twenty-seven (27) different storage arrays or array series from twelve (12) different storage providers.

Hybrid storage arrays promise to deliver the dramatic

performance of all-flash storage arrays, but at a lower cost because hybrid storage uses both flash memory and hard disk drives. The "*secret sauce*" varies from vendor to vendor; but in every case, it involves sophisticated caching and/or automated storage tiering software.

Due to the large number of hybrid storage array products offered, DCIG segmented the products by maximum capacity. This Buyer's Guide evaluates products which scale to <1 PB.

DCIG's goal in preparing this guide is to evaluate, score and rank each solution based upon a comprehensive list of features that reflects the needs of the widest range of organizations. Scoring and ranking tables enable end users to do "*at-a-glance*" comparisons between many different array models; and our standardized data sheets facilitate side-by-side comparisons which enable organizations to quickly get to a short list of products that may meet their requirements.

These hybrid storage arrays are especially well-suited for midsize organizations as the arrays:

- Deliver performance and functionality at an attractive price when compared to traditional arrays
- Scale to a storage capacity suitable for many midsize organizations
- Provide simplified management interfaces to minimize installation and on-going administration costs

The DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide Top 11 solutions include (in alphabetical order):

- HP 3PAR StoreServ 7200c
- iXsystems TrueNAS Z20
- iXsystems TrueNAS Z30
- NexGen N5-1000 Hybrid Flash Array
- NexGen N5-200 Hybrid Flash Array
- NexGen N5-300 Hybrid Flash Array

- NexGen N5-500 Hybrid Flash Array
- Tegile T3100
- Tegile T3200
- Tegile T3300
- Tegile T3400

The **HP 3PAR StoreServ 7200c** earned the *Best-in-Class* ranking among all Midsize Enterprise Hybrid Storage Arrays in this Buyer's Guide. The StoreServ 7200c stood out by offering all of the following capabilities:

- The **best balance of strengths** across all the scoring categories
- Scored *Excellent* or betterin all scoring categories

About the DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide

DCIG creates Buyer's Guides in order to help end users accelerate the product research and selection process—driving cost out of the research process while simultaneously increasing confidence in the results.
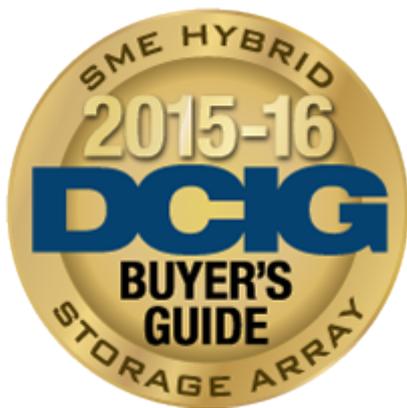
The DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide achieves the following objectives:

- Provides an objective, third party evaluation of products that evaluates and scores their features *from an end user's perspective*
- Ranks each array in each scoring category and then presenting these results in an *easy to understand* table
- Provides a *standardized data sheet* for each of the arrays so users may do quick side-by-side comparisons of products
- Provides insights into what features the arrays offer to optimize integration into virtualized environments
- Provides insight into which features will result in improved performance
- Gives any organization a solid foundation for getting

competitive bids from different providers that are based on "*apples-to-apples*" comparisons

The DCIG 2015-16 Midsize Enterprise Hybrid Storage Array Buyer's Guide is available immediately to subscribing users of the [DCIG Analysis Portal](). All DCIG Buyer's Guides are available for download at no charge to any end-user who [registers]() for the DCIG Analysis Portal.

DCIG 2015-16 Small/Midsize Enterprise (SME) Hybrid Storage Array Buyer's Guide Now Available

DCIG is pleased to announce the March 27 release of the *DCIG 2015-16 Small/Midsize Enterprise (SME) Hybrid Storage Array Buyer's Guide* that weights, scores and ranks more than 90 features of twenty-two (22) hybrid storage arrays from nine (9) different storage providers.

Hybrid storage arrays promise to deliver the dramatic performance of all-flash storage arrays, but at a lower cost because hybrid storage uses both flash memory and hard disk drives. The "secret sauce" varies from vendor to vendor; but in every case, it involves sophisticated caching and/or automated storage tiering software.

The SME designation is based on limiting this Buyer's Guide to products which scale to less than 500 TB maximum raw capacity. In many cases this capacity limit correlates to other functionality important to smaller enterprises, including simplified management that minimizes installation and on-going administration costs.

DCIG's goal in preparing this guide is to evaluate, score and rank each solution based upon a comprehensive list of features. Scoring and ranking tables enable end users to do "at-a-glance" comparisons between many different array models; and standardized one-page data sheets facilitate side-by-side comparisons that enable organizations to quickly get to a short list of products that may meet their requirements.

The DCIG 2015-16 SME Hybrid Storage Array Buyer's Guide Top 9 solutions include (in alphabetical order):

- iXsystems TrueNAS Z20
- NexGen N5-1000 Hybrid Flash Array
- NexGen N5-200 Hybrid Flash Array
- NexGen N5-300 Hybrid Flash Array
- NexGen N5-500 Hybrid Flash Array
- Tegile T3100
- Tegile T3200
- Tegile T3300
- Tegile T3400

The **Tegile T3400** earned the *Best-in-Class* ranking among all hybrid storage arrays in this buyer's guide. The T3400 stood out by offering the **best balance of strengths** across all the

scoring categories. The T3400 array incorporates 28.2 TB of raw flash capacity in a 2U form factor. The T3400 can function either as a hybrid array or as an all-flash array depending on which shelves are used for expanded storage.

We continue to be impressed by not only the quality of features in Tegile's products but also the breadth of offerings they have produced with their line of hybrid and flash storage arrays. Tegile consistently achieves high marks in our comparative analyses of various solutions from vendors throughout the industry. That they are able to achieve these high scores in not just one but multiple DCIG Buyer's Guides across various markets is a very impressive feat.

About the DCIG 2015-16 SME Hybrid Storage Array Buyer's Guide

DCIG creates Buyer's Guides in order to help end users accelerate the product research and selection process—driving cost out of the research process while simultaneously increasing confidence in the results.
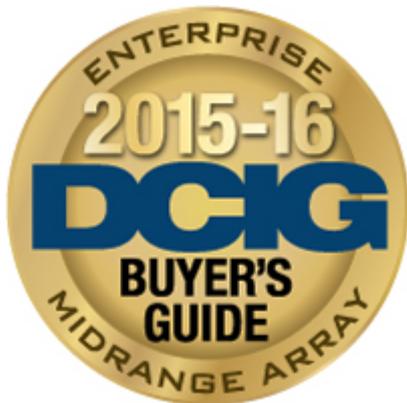
The DCIG 2015-16 SME Hybrid Storage Array Buyer's Guide achieves the following objectives:

- Provides an objective, third party evaluation of products that evaluates and scores their features *from an end user's perspective*
- Ranks each array in each scoring category and then presenting these results in an *easy to understand* table
- Provides a *standardized data sheet* for each of the arrays so users may do quick side-by-side comparisons of products
- Provides insights into what features the arrays offer to optimize integration into virtualization environments
- Provides insight into which features will result in improved performance
- Gives any organization a solid foundation for getting competitive bids from different providers that are based

on "apples-to-apples" comparisons

The DCIG 2015-16 SME Hybrid Storage Array Buyer's Guide is available immediately to subscribing users of the [DCIG Analysis Portal](). All DCIG Buyer's Guides are available for download at no charge to any end-user who [registers]() for the DCIG Analysis Portal.

DCIG 2015-16 Enterprise Midrange Array Buyer's Guide Now Available

DCIG is pleased to announce the December 17 release of the **DCIG 2015-16 Enterprise Midrange Array Buyer's Guide** that weights, scores and ranks more than 95 features of thirty-three (33) different storage arrays or array series from sixteen (16) different storage providers.

The midrange array category is quite large and is usually broken down into several additional categories. The most basic breakdown is by how the storage is accessed: Storage Area Network (SAN), Network Attached Storage (NAS), or both.

This Buyer's Guide focuses on SAN arrays designed for the enterprise data center. Although a number of the products included in this guide also support NAS protocols—and the data sheets reflect some NAS features—the arrays were evaluated on the basis of their enterprise SAN features.

DCIG's goal in preparing this guide is to evaluate, score and rank each solution based upon a comprehensive list of features that reflects the needs of the widest range of organizations. Scoring and ranking tables enable end users to do "at-a-glance" comparisons between many different array models; and our standardized data sheets facilitate side-by-side comparisons which enable organizations to quickly get to a short list of products that may meet their requirements.

Enterprise midrange arrays are especially well-suited for medium-sized enterprises because the arrays:

- Provide a high degree of availability by implementing a dual-controller architecture and redundant/hot swap components
- Scale up storage capacity and performance through the addition of disks and/or nodes
- Scale up performance through the use of flash memory as a large shared cache and/or high-performance storage tier

The DCIG 2015-16 Enterprise Midrange Array Buyer's Guide Top 8 solutions include (in alphabetical order):

- EMC VNX5000/7000/8000 Series (VNX8000)
- FUJITSU Limited ETERNUS DX S3 Series (DX600)
- HDS Hitachi Unified Storage VM
- HP 3PAR StoreServ 7400 Series (7440c)
- IBM Storwize V7000 (V7000 Unified)
- NetApp FAS8000 Series (FAS8040)
- Oracle ZFS Storage Appliance (ZS4-4)
- Tegile T3000 Series (T3400)

The **HP 3PAR StoreServ 7400 Series (7440c)** earned the *Best-in-Class* ranking among all Enterprise Midrange Arrays in this buyer's guide. The StoreServ 7400 Series stood out by offering all of the following capabilities:

- The **best balance of strengths** across all the scoring categories, including achieving *Best-in-Class* in both *Management* and *Virtualization*.
- **Outstanding management integration.** The 7400 Series can be managed and monitored from within leading hypervisor management consoles including VMware vCenter and Microsoft System Center (SCVMM), as well as OpenStack and SMI-S storage management interfaces.
- **Superb virtualization support.** The 7440c supports all of the VMware VAAI 4.x and 5.x and all of the other VMware storage integrations surveyed— including VASA, VASRM, VADP, SIOC, and Storage DRS. The array also supports Microsoft ODX as well as the Hyper-V and Oracle VM hypervisors.
- **Support for both remote monitoring and proactive remediation**. Proactive remediation adds value by minimizing the number and duration of service interruptions and by reducing the troubleshooting time and expertise required of business IT staff.

About the DCIG 2015-16 Enterprise Midrange Array Buyer's Guide

DCIG creates Buyer's Guides in order to help end users accelerate the product research and selection process—driving cost out of the research process while simultaneously increasing confidence in the results.

The DCIG 2015 Enterprise Midrange Array Buyer's Guide achieves the following objectives:

- Provides an objective, third party evaluation of products that evaluates and scores their features *from an end user's perspective*

- Ranks each array in each scoring category and then presenting these results in an *easy to understand* table
- Provides a *standardized data sheet* for each of the arrays so users may do quick side-by-side comparisons of products
- Provides insights into what features the arrays offer to optimize integration into virtualization environments
- Provides insight into which features will result in improved performance
- Gives any organization a solid foundation for getting competitive bids from different providers that are based on "apples-to-apples" comparisons

The DCIG 2015-16 Enterprise Midrange Array Buyer's Guide is available immediately to subscribing users of the [DCIG Analysis Portal](). Individuals who have not yet subscribed to the DCIG Analysis Portal may test drive the DCIG Analysis Portal for 30 days as well as download this Guide by following this [link]().

Four Early Insights from the Forthcoming DCIG 2015-16 Enterprise Midrange Array Buyer's Guide

DCIG is preparing to release the DCIG 2015-16 Enterprise Midrange Array Buyer's Guide. The Buyer's Guide will include data on 33 arrays or array series from 16 storage providers. The term "Enterprise" in the name Enterprise Midrange Array, reflects a class of storage system that has emerged offering

key enterprise-class features at prices suitable for mid-sized budgets.

In many businesses, there is an expectation that applications and their rapidly growing data will be available 24x7x365. Consequently, their storage systems must go beyond traditional expectations for scalable capacity, performance, reliability and availability. For example, not only must the storage system scale, it must scale without application downtime.

These expectations are not new to large enterprises and the high end storage systems that serve them. What is new is that these expectations are now held by many mid-sized organizations—the kind of organizations for which the products in this guide are intended.

While doing our research for the upcoming Buyer's Guide, DCIG has made the following observations regarding the fit between the expectations of mid-sized organizations and the features of the enterprise midrange arrays that will be included in the Buyer's Guide:

Non-disruptive upgrades. In order to meet enterprises' expectations, storage systems must go beyond the old standard availability features like hot swap drives and redundant controllers to provide for uninterrupted operations even during storage system software and hardware upgrades. Consequently, this year's guide evaluates multiple NDU features and puts them literally at the top of the list on our data sheets. Over one third of the Enterprise Midrange Arrays support non-disruptive upgrade features.

Self-healing technologies. While self-healing features are relatively new to midrange storage arrays, these technologies help an array achieve higher levels of availability by enabling the array to detect and resolve certain problems quickly, and with no or minimal human intervention.

Self-healing technologies have been implemented by some

storage vendors, but these are seldom mentioned on product specification sheets. DCIG attempted to discover which arrays have implemented self-healing technologies such as bad block repair, failed disk isolation, low-level formatting and power cycling of individual drives; but we suspect (and hope) that more arrays have implemented self-healing capabilities than we were able to confirm through our research.

Automation. Data center automation is an area of growing emphasis for many organizations because it promises to reduce the cost of data center management and enable IT to be more agile in responding to changing business requirements. Ultimately, automation means more staff time can be spent addressing business requirements rather than performing routine storage management tasks.

Organizations can implement automation in their environment through management interfaces that are scriptable or through APIs and SDKs provided by storage vendors. Last year's Enterprise Midrange Array Buyer's Guide prediction that 'support for automated provisioning would improve in the near future' was correct. While less than 20% of midrange arrays in last year's Buyer's Guide exposed an API for third-party automation tools, the percentage has more than doubled to 50% in this year's guide. Provision of an SDK for integration with management platforms saw a similar increase, rising from 11% to 25%.

Multi-vendor virtualization. A growing number of organizations are embracing a multi-vendor approach to virtualization. Reflecting this trend, support for Microsoft virtualization technologies is gaining ground on VMware among enterprise midrange arrays.

The percentage of arrays that can be managed from within Microsoft's System Center Virtual Machine Manager (SCVMM) now matches vSphere/vCenter support at 33%. Support for Microsoft Windows Offloaded Data Transfer (ODX), a Windows Server 2012

technology that enhances array throughput, is now at 19%.

Although the gap between Microsoft and VMware support is narrowing, support for VMware storage integrations also continues to grow. VAAI 4.1 is supported by 90% of the arrays, while SIOC, VASA and VASRM are now supported by over 50% of the arrays.

The *DCIG 2015-16 Enterprise Midrange Array Buyer's Guide* will provide organizations with a valuable tool to cut time and cost from the product research and purchase process. DCIG looks forward to providing prospective storage purchasers and others with an interest in the storage marketplace with this tool in the very near future.

The Architecture, Database Storage Efficiency and Performance Tools of Oracle ZS4-4 Hybrid Storage Array Give It a Decided Edge in Oracle Database Environments

Hybrid storage arrays, which dynamically place data in storage pools that combine flash memory and HDDs, are rapidly expanding their market share in the enterprise space. These arrays use the latest generation of hardware — including multi-core CPUs and DRAM and flash caches — to offer high levels of performance and inline data optimization.

When businesses evaluate storage solutions for their Oracle Database environments, the newly [announced](#) Oracle ZFS Storage [ZS4-4](#) hybrid storage array and the NetApp FAS8080 EX are likely to make it onto many enterprise buying short lists. On the surface, the two arrays offer similar functionality. However, the ZS4-4's underlying architecture and its unique ability to integrate with Oracle Database 12c make it a superior storage platform to accelerate Oracle Database performance and reduce storage capacity requirements.

High Performance Architecture

The ZS4-4 [hardware](#) includes 120 processor cores and 3 TB of DRAM cache. This is 3x the number of CPU cores and 12x the amount of DRAM cache found in the NetApp FAS8080 EX. The ZS4-4's Symmetric Multi-Processing (SMP) OS8.3 takes full advantage of this superior processing power as it can run all 120 cores in parallel while the ZS4-4's DRAM-centric architecture leverages its 3TB DRAM cache size to service up to 90% of IOs from ultra-low latency DRAM. The ZS4-4 also dynamically adjusts I/O packet sizes sent by an Oracle Database 12c to accelerate and optimize data transmissions.

Superior Data Storage Efficiency

Both the ZS4-4 and the FAS8080 EX offer deduplication and compression but only the ZS4-4 utilizes Automatic Data Optimization ([ADO](#)) with Hybrid Columnar Compression ([HCC](#)) to automate storage tiering and compression of Oracle Database 12c data. ADO uses heat map data — in combination with usage patterns and/or user-defined policies — to automatically move and/or compress Oracle Database 12c data. *"Hot"* data may be left uncompressed while *"cool"* or *"cold"* data may be compressed which may yield 10x to 50x space savings.

Storage Performance Tuning and Visibility

The Oracle Intelligent Storage Protocol ([OISP](#)) — available with Oracle Database 12c — passes metadata directly to the

ZS4-4, enabling the database to dynamically setup and tune itself. ZS Analytics can then be used to pinpoint bottlenecks and optimize storage performance in real-time in ways in which the FAS8080 EX does not currently offer.

By co-engineering with Oracle Database, the Oracle ZS4-4 obtains real-time analytics across thousands of pluggable databases. With 12c, enterprises can run a container database that hosts hundreds of pluggable databases. The net result is up to a 5x increase in scalability with 6x less resources than a conventional database implementation. In contrast, NetApp management software provides limited to no visibility into the individual pluggable databases or container databases.

The Oracle ZS4-4 leverages Oracle's inherent in-depth knowledge of Oracle Database 12c to deliver radically better data efficiency and database performance than competing solutions as the ZS4-4 may be viewed as an extension of Oracle Database. Deploying the ZS4-4 with Oracle Database 12c enables enterprises to capitalize on its architectural design, storage efficiencies and management tools to optimize Oracle Database performance and reduce storage capacity in ways that the NetApp FAS8080 EX cannot yet deliver.

DCIG 2014-15 High End Storage Array Buyers Guide Now Available

DCIG is pleased to announce the release of its **2014-15 High End Storage Array Buyer's Guide** that weights, scores and ranks more than 100 features of thirteen (13) different storage arrays from five different storage providers.

Due to the scalability and high availability criteria that were used to evaluate these high end storage arrays, the number of reviewed products is relatively small compared to other DCIG Buyer's Guides. However, this inaugural guide provides enterprises with a comprehensive list of high end storage arrays' supported features and functionality to assist them in this all-important buying decision.

High end storage arrays are especially well-suited for large enterprises because the arrays:

- Scale up storage capacity and performance through the addition of disks and/or nodes
- Provide high availability by implementing active-active controllers
- Support multiple ports and storage networking interfaces such as Ethernet, Fibre Channel (FC) and Fibre Connection (FICON)
- Provide a mature and feature-rich suite of data management services
- Support virtualization integration leveraging VMware's API's to offload some processing to the storage array
- Provide performance monitoring for the entire array and various components
- Provide storage efficiencies via automated storage tiering
- Support non-disruptive upgrades

The DCIG 2014-15 High End Storage Array Buyer's Guide Top 5 solutions include (in alphabetical order):

- HDS [VSP G1000](#)
- HP [XP7](#)
- HP 3PAR [StoreServ 10400](#)
- HP 3PAR [StoreServ 10800](#)
- NetApp [FAS8080 EX](#)

The **HP 3PAR StoreServ 10800** earned the "Best-in-Class" ranking among the high end storage arrays evaluated this year. In comparison to its counterparts, this array stood out in the following ways:

- Achieved the highest overall score
- Achieved the highest score in Software and VMware Integration categories
- Supports all VAAI 4.x and 5.x features earning a "Best-in-Class" ranking in VMware integration
- It represented the best balance of strengths across all the scoring categories

About the DCIG 2014-15 High End Storage Array Buyer's Guide

Selecting and comparing vendors and researching their products can be a daunting task. DCIG creates Buyer's Guides in order to help end users accelerate the product research and selection process—driving cost out of the research process while simultaneously increasing confidence in the results.

Organizations should therefore use this Buyer's Guide as a handbook to understand who the high end storage players are, what products they offer, what features and functions are available on each, how these solutions scale, what networking and storage protocols they offer, and how organizations might manage any solution they purchase.

The DCIG 2014-15 High End Storage Array Buyer's Guide achieves the following objectives:

- Provides an objective, third party evaluation of products that evaluates and scores their features *from*

an end user's perspective

- Ranks each array in each scoring category and then presenting these results in an *easy to understand* table
- Provides a *standardized data sheet* for each of the arrays so users may do quick side-by-side comparisons of products
- Provides insights into the high availability and scalability of the arrays as well as what features the arrays offer
- Gives any organization a solid foundation for getting competitive bids from different providers that are based on "apples-to-apples" comparisons

The DCIG 2014-15 High End Storage Array Buyer's Guide is available immediately through the DCIG Analyst Portal for subscribing users by following this [link](#).

Six Observations about Today's High End Storage Arrays

Enterprises investing in today's high end storage arrays understand the value that these arrays offer in regard to their availability and performance as it can [cost](#) upwards of $5,000 for every minute that an application is offline. Applications and data must be available all of the time as any interruption in service can seriously impact a corporation's revenue and reputation.

Selecting the appropriate high end storage array that offers the correct combination of features and functionality for an enterprise can mitigate the possibility of outages and the

costs associated with them. This explains why high end storage arrays, even many years after their introduction, remain more than a popular choice to host today's centralized, virtualized applications. They are, in essence, experiencing a rebirth of sorts.

However, choosing any high end storage array requires a substantial investment in both time and money to research and implement. Further, there are notable differences between each array that DCIG classifies as *"high end."* This is why DCIG is producing a Buyer's Guide on High End Storage Arrays that it anticipates releasing in the very near future.

In that vein, as DCIG has done research on these arrays, it has made the following six observations about them and the environments into which they are going into.

- *High application availability.* Possibly the most desirable feature on these arrays that prompts so many enterprises to deploy them is their high availability (HA). Yet what differentiates them is that vendors employ various methodologies to deliver HA with options to scale up, scale out or both to deliver HA. At the most fundamental level, these arrays support multiple pairs of Active-Active controllers (also implemented as *"blade pairs"* or *"processor pairs"* on some of these arrays) on the same physical array that are all part of the same logical array configuration.
- *Large hardware capacities.* Each high end array also has high capacities in regard to its cache, raw storage and processing. Over half of the arrays scale to support upwards of 3,000 GB (3 TBs) of cache, 67 percent of the arrays support at least 4,500TB (4.5 petabytes) of raw storage capacity and 60 percent of the arrays scale out to support at least 64 processor cores.
- *Multiple storage networking interfaces.* All of the storage arrays covered in the forthcoming Buyer's Guide have a minimum of 20 storage networking ports available

while 80% had up to 64 networking ports. The interface types vary by vendor and product, but all of the arrays support 8Gb Fibre Channel (FC), 75 percent support 16Gb FC, 87 percent offer 10Gb Ethernet and one-third of the arrays support 8Gb FICON (used in mainframe environments.)

- **_Robust VMware integration._** Given VMware's predominance in enterprise data centers today, it follows that they want storage arrays that can integrate with VMware vStorage APIs such as VAAI (vStorage APIs for Array Integration) and VASA (vSphere Storage APIs for Storage Awareness) to take advantage of the "force multiplication" that these APIs provide. The good news is that all of the high end storage arrays in this upcoming Buyer's Guide support all of the VAAI v4 APIs and the majority of the options in VAAI v5. Similarly, all of the arrays support VASA.

- **_OS and application performance monitoring._** Managing any enterprise data center is challenging, but managing one without visibility into each application's performance so that one can diagnose and even anticipate pro-actively anticipate problems can be foolhardy.

Using these performance monitoring and management tools, administrators can quickly pinpoint performance bottlenecks or what piece of hardware inside of the array is malfunctioning.All of the arrays provide some level of performance monitoring, with over 80 percent of the arrays providing physical drive monitoring while over 50 percent provide monitoring on a per application level. However, there is still some disparity in the ability of these arrays to monitor performance at the OS (Operating System) and VM (Virtual Machine) level so enterprises need to exercise some caution in which one they select as not all of these arrays may offer the full suite of software that they need to fully monitor and manage performance for all OSes and applications.

- ***Automation.*** Data center automation is another growing area of emphasis for many enterprises as it facilitates efficient management of their data center infrastructure and more agile responses from IT to changing business requirements. Ultimately, automation means more staff time can be spent addressing business requirements rather than managing the routine tasks of a data center.

Currently, 71% of the high end arrays support policy-based storage selection. However, only 28% expose their APIs for third-party automation tools, while 42% provide an SDK for integration with management platforms. As more enterprises place a premium on automating their storage environment, look for these numbers to increase.

Six Ways Public Cloud Gateways Benefit Businesses

An Omaha city employee recently gained unwanted public visibility after they sent twelve filing cabinets containing a hundred years of irreplaceable original building permits from the basement of City Hall to the county dump. It turns out that the head of the permits and inspections division decided to get rid of the cabinets as part of cleaning out its basement storage area. They did not realize that other city employees regularly pulled the permits, which dated from the 1880s through the 1980s. They were also apparently unaware that a local preservation group was developing a plan to move the permits to a new facility in order to make the permits more secure and accessible to the public.[1]

Nobody wants to be the person that threw away valuable data. Yet how many times have IT teams sent out an email asking end-

users to "clean up" their workspaces because a particular file system is full? Even in this era of big data and data analytics, businesses that are outgrowing their data storage systems may be hesitant to invest tens or hundreds of thousands of dollars to acquire a new storage system and embark on a potentially painful data migration project.

Like Omaha's City Hall, businesses often face what appear to be incompatible priorities. IT departments are expected to keep spending in check and know that only 10-20 percent of data is ever accessed after 60 days of its creation. But knowing which data to keep available and which data to delete or archive can be a challenge. This type of dilemma is one of many drivers in the development of a new group of storage systems—public cloud gateways.

Public cloud gateways offer some of the same features found in traditional storage systems with one important distinction—the ability to seamlessly store data the cloud. This new class of storage systems is garnering much deserved attention as the business demand of retaining vast amounts of data is requiring IT organizations to reevaluate their data storage strategy.

Public cloud gateways are a relatively new but dynamic segment of the data storage marketplace. Most public cloud gateways were released in the last four or five years, yet this market segment has already grown to an estimated $13.57 billion in 2014 and is expected to reach $56.57 billion in 2019—a Compound Annual Growth Rate (CAGR) of 33.1%[2]. While the storage industry mainstays NetApp and EMC now offer products in this space, it has largely been led by a number of startups including Avere, CTERA, Nasuni, Panzura, StorSimple and TwinStrata.

Defining a Public Cloud Gateway

A Public Cloud Storage Gateway (PCG) is a physical or virtual appliance that resides on the customer's premises and makes

public cloud storage available to an organization's users and applications via familiar file-based (and optionally block and/or object) protocols. The appliance may also serve as an on-premise storage system or integrate with other on-premise storage systems to provide low-latency access to cloud-based storage.

These gateways retain the active or "hot" data locally, generally on high-performance and relatively expensive cache or SSD. Some public cloud gateways immediately store a copy of all data to the cloud. Other PCGs use the cloud as a storage tier and as the data begins to "cool" (is accessed less frequently), the gateway migrates this static data to the cloud.

Business benefits of a Public Cloud Gateway

- *Improve agility.* Businesses can add capacity in the cloud on demand—eliminating long purchase and implementation delays.
- *Reduce costs.* Organizations can reduce storage, maintenance and administration costs by minimizing on premise storage expansion and/or reducing the number of active storage arrays.
- *Pay only for what is actually used.* Companies can capitalize on the cloud's "pay-as-you-grow" options to retain larger archives without paying for unused capacity as well as benefit from the steady drop in cloud storage prices.
- *Low-latency access to data in the cloud.* Local caching of active data makes data appear to end-users as if was stored locally when it is primarily stored in the cloud. PCGs deliver the speed of local systems with the scalability and accessibility of the cloud.
- *All data is available on demand.* With cloud storage, the data you need is available when you need it. Active archives offer access to all of the data as if it had never been archived, eliminating the delays associated

with restoring data from backups.

- ***Disaster recovery.*** Cloud storage provides the advantage of geographical redundancy and global availability which can aid in disaster recovery/business continuity.

Use Cases for a Public Cloud Gateway

The Public Cloud Gateway's versatility make it appealing across businesses and industries regardless of size or location. Below are some common use cases for public cloud gateways:

- ***Branch offices.*** Branch offices gain low-latency access to the corporate data they need in spite of limited bandwidth.
- ***Disaster Recovery / Business Continuity.*** Public cloud gateways can be used to supplement disaster recovery and business continuity plans. The gateways can backup and access critical data in the cloud providing geographical redundancy and rapid recovery.
- ***Collaboration.*** Global namespace and file-locking capabilities allow organizations to use public cloud gateways as a collaboration tool to manage file sharing among users and make files available outside the corporate firewall.
- ***Archiving.*** The public cloud gateway allows businesses to seamlessly use cloud storage for active archives.

The ability to address multiple use cases and to resolve business dilemmas is resulting in rapid adoption of public cloud gateways. They offer a unique blend of local and unlimited cloud storage. As the market for cloud storage continues to grow and mature, look for public cloud gateways to find a home in many datacenters.

[1] Sloan, Karen. "Historians Grieve Archive Loss Valued Building Permits Dumped." *Omaha World Herald* [Omaha] 19 Nov. 2006, News sec.: 01. Print.

[2] "Public/Private Cloud Storage Market worth $56.57 Billion by 2019", https://www.marketsandmarkets.com/PressReleases/cloud-storage.asp