

DELL EMC XTREMIO X2: NEXT-GENERATION ALL-FLASH ARRAY

Realizing New Levels of Efficiency, Performance, Availability and TCO

ESSENTIALS

Performance and Efficiency

- Predictable and consistent high performance with low sub-millisecond latency
- 4 to 20 times data reduction using inline deduplication, compression, XtremIO Virtual Copies, and thin provisioning
- Ease of use—nothing to configure or tune

Applications

- Exceed the toughest SLAs for virtualized workloads
- Enable near real-time copies of production datasets
- Provide self-service operations for infrastructure and application teams

BUSINESS BENEFITS

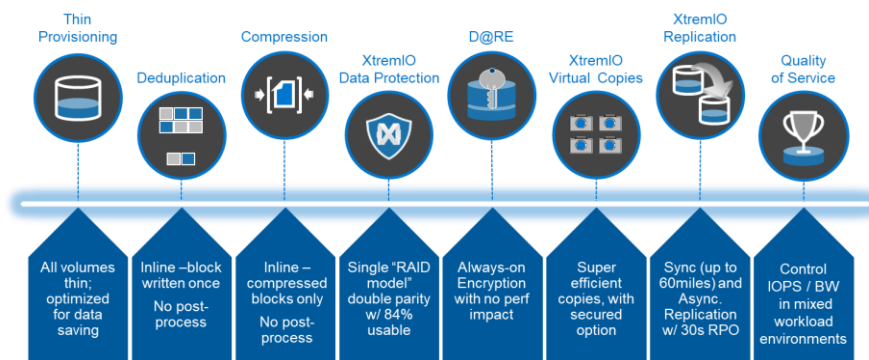
- Utilize unique copy data management capabilities to unlock business agility through improved workflows
- Reduce cost by one third and provide more efficient scaling options
- Offers flexible, efficient and scalable native data protection options
- Achieve two times longer storage product lifecycles than traditional arrays
- Experience/Receive investment protection via Dell EMC's Future-Proof Loyalty Program

Dell EMC XtremIO X2: Differentiated Architecture

Dell EMC XtremIO is a purpose-built all-flash array that provides consistent high performance with low latency; unmatched storage efficiency with inline, all-the-time data services; rich application integrated copy services; and unprecedented management simplicity.

The next-generation platform, XtremIO X2, builds upon unique features of XtremIO to provide even more agility and simplicity for your data center and business. Content-aware, in-memory metadata and inline, all-the-time data services have made XtremIO the ultimate platform for virtual server and desktop environments and workloads that benefit from efficient copy data management. The architecture offers two times faster VMware XCOPY operations, which can reach as high as 40 GB/s bandwidth due to being an in memory operation.

X2 includes inline, all-the-time data services: thin provisioning, deduplication, compression, synch and asynch replication, D@RE, XtremIO virtual copies (XVC), and double SSD failure protection with zero performance impact. Only XtremIO's unique in-memory metadata architecture can accomplish this.



XtremIO Advanced Data Services

Volumes are always thin-provisioned. XtremIO's in-memory deduplication is global—across the entire XtremIO cluster, irrespective of the number of X-Bricks in a cluster. This means that XtremIO only writes unique data—data that the entire cluster didn't see in its I/O history—to the SSDs. This inline deduplication not only saves significant capacity but can also improve performance. Inline compression also adds to XtremIO's data reduction efficiencies.

KEY FEATURES

Multi-Dimensional Scale

- Scale-up and out using Online Cluster Expansion
- Consistent, predictable sub-millisecond latency as you scale
- Non-disruptive, granular scaling

In-Memory, All-the-Time Data Services

- Automatic thin provisioning
- Global in-line deduplication and compression
- Flash-optimized XtremIO data protection
- Data-at-rest encryption
- Agile, space-efficient data copies via XVC

Integrated Copy Data Management

- Leverages XVC which gets the same performance and data services as source volumes
- Creates operational efficiency and agility for Dev/Test, analytics, and data protection workloads by allowing immediate, memory and space efficient, high performance copies that can be refreshed/restored in any direction
- Integrates with business applications to create automated storage management workflows
- Enables self-service models for DBAs and application owners

Efficient and Flexible Remote Replication

- Synch and Asynch options supported concurrently
- Metadata-aware: Never replicates data blocks that already exist at the target site.
- Zero RPO for Synch mode and 30 second RPO's¹ for Asynch mode
- Requires up to 38% less storage²
- Reduce WAN bandwidth by 75% or greater³
- Simple wizard-based management

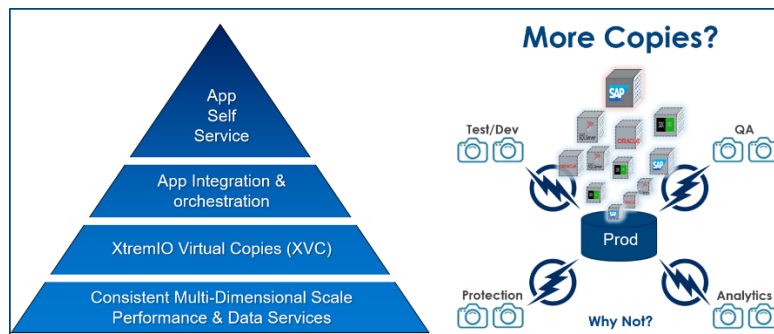
XtremIO Virtual Copies (XVC) help provision and deploy space-efficient, instant virtual data copies without impacting system performance. Compared to legacy arrays, X2 enables average savings of 4 to 20 times of the amount of physical capacity needed thanks to all these data reduction methods. XVC Snapshots can be read/write, read/only, management protected (non-deletable) or secure (immutable) for flexible protection.

XtremIO has developed a flash-based data protection algorithm that offers better than RAID 1 performance with better than RAID 5 capacity savings and protection comparable to RAID 6. It provides dual parity with as little as 10 percent capacity overhead. In addition, all data services are included with the platform at no additional charge.

X2 provides consistent performance for all block sizes and all read/write mixes throughout the lifecycle of the array. And integrated Copy Data Management (iCDM) capabilities enable you to create, refresh, and restore thousands of production copies, and run workloads on them, without performance impact or any storage overhead—accelerating business agility.

Integrated Copy Data Management

XtremIO pioneered the concept of iCDM—the ability to consolidate both primary data and its associated copies on a scalable all-flash array for unprecedented agility and efficiency. iCDM offers application integration, orchestration, and self-service for all copies. With XVC, you can provision copies that are immediately usable by the application, enabling fast deployments and ensuring those deployed copies are fully functional.



XtremIO Integrated Copy Data Management

XtremIO exposes its agile and efficient copy services to application teams via Dell EMC AppSync software. AppSync provides application integration and orchestration services for XVC. It simplifies and automates the process of creating and consuming XVC for iCDM use cases. AppSync also provides local and remote recovery using XVC and replication technologies. Its deep application integration enables application owners or DBAs to satisfy copy demand for operational recovery and data repurposing. An AppSync iCDM Starter Bundle is included with every XtremIO purchase.

X2 with Version 6.3 XIOS software delivers up to **four** times as many XVCs per cluster as compared to the previous version. This enables you to take virtual copies more frequently and retain them for longer periods of time. This is important for organizations that are using iCDM for data protection because it will allow them to set even shorter recovery point objectives (RPOs) and retain more restoration points-in-time.

What's New

- Synchronous replication. V6.3
- Secure snapshots that cannot be deleted by Non-Dell EMC personnel under any circumstances, in order to protect against cyber-attack. V6.3
- Increased infrastructural scale, supporting up to 32K Objects (root volumes + snaps) per cluster. V6.3
- CloudIQ integration for real-time proactive health monitoring and predictive analytics. V6.2
- Enhanced Online Cluster Expansion to support scaling up and out X-Bricks with different numbers of SSDs in a single cluster. V6.2
- Quality of service (QoS) control of IOPS or bandwidth within mixed workload environments. V6.2
- Enhanced AppSync XMS integration for VMware environments. V6.2
- Larger 3.84TB SSD drive X-Bricks. V6.2

Multi-Dimensional Scalability with Lower TCO

XtremIO X2 has the ability to scale out while also allowing customers to scale up the capacity for their workloads. The hardware building block for XtremIO is X-Brick. Each X-Brick in fact consists of two active-active controller nodes, with no single point of failure, packaged together. The X-Bricks are built entirely on enterprise-grade hardware components. X2 multi-dimensional scalability enables you to scale up by adding as few as two SSDs at a time to a single X2 X-Brick. You can also scale out with additional X-Bricks—including partially populated X-Bricks. What's more, the Online Cluster Expansion (OCE) capabilities enable you to do all of this without impacting performance or application downtime.

X2 leverages powerful Intel CPUs and expanded memory to optimize performance and enable consistent sub-millisecond latency. XtremIO X2 X-Bricks are available in three models: X2-S, X2-T and X2-R.

Configuration	X-Brick Minimum Raw	X-Brick Maximum Raw	X-Brick Typical Max Effective*
X2-S (400GB)	7.2 TB / 6.6 TiB (18 drives)	28.8 TB / 26.2 TiB (72 drives)	99.5 TB / 90.5 TiB
X2-T** (1.92TB)	34.6 TB / 31.4 TiB (18 drives)	69.1 TB / 62.9 TiB (36 drives)	247 TB / 224.6 TiB
X2-R (1.92TB)	34.6 TB / 31.4 TiB (18 drives)	138.2 TB / 125.7 TiB (72 drives)	494.8 TB / 450 TiB
X2-R (3.84TB)	69.1 TB / 62.9 TiB (18 drives)	230.4 TB / 209.6 TiB (60 drives)	815.1 TB / 741.3 TiB

* Effective capacity assumes 4:1 DRR, and 88%-90% useable capacity

** X2-T can be upgraded to X2-R online

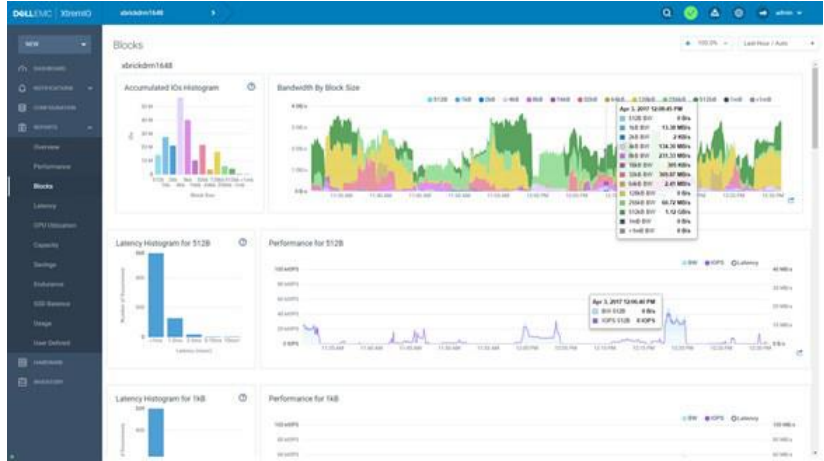
Software-Driven Performance and Efficiency Improvements

Hardware improvements alone can only take a platform so far. With the release of X2, Dell EMC introduced enhanced data reduction algorithms to improve data reduction by 25 percent⁴ on average.

XIOS software incorporates specific optimizations to greatly improve performance across the board but especially boosts small block IO performance. X2 combined with XIOS dramatically improves application performance for up to 80 percent better response time⁵ and 40 percent more concurrent users for VDI. There are also a number of enhancements to user experience that simplify administration.

XtremIO has always provided simple, easy-to-use management. XIOS delivers an HTML5 user interface for consumer-grade simplicity with enterprise-class features. The improved user interface includes:

- Contextual, automated workflow suggestions for management activities
- Advance reporting and analytics that make it easy to troubleshoot
- Global search to quickly find that proverbial needle in a haystack



XtremIO provides a powerful HTML5 user interface

The simple, yet powerful user interface drives efficiency by enabling storage administrators to spend less time on storage provisioning and performance tuning and more time on strategic IT initiatives.

Delivering Efficiency and Simplicity at Scale

XtremIO combines efficiency and simplicity for deployment and administration of not only the array but also for all workloads that reside on it. Architectural planning sessions for applications are drastically simplified with XtremIO's consistent and predictable response times in a scalable deployment that can grow to meet the future needs of your business.

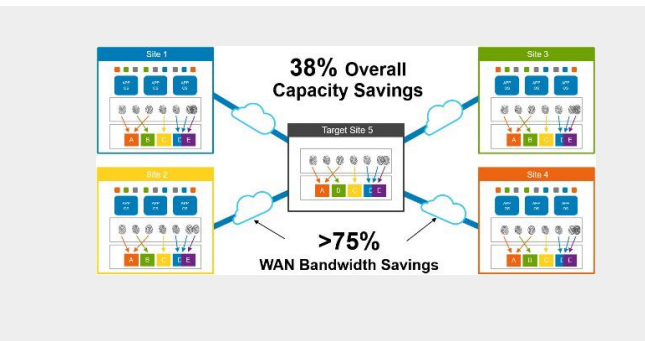
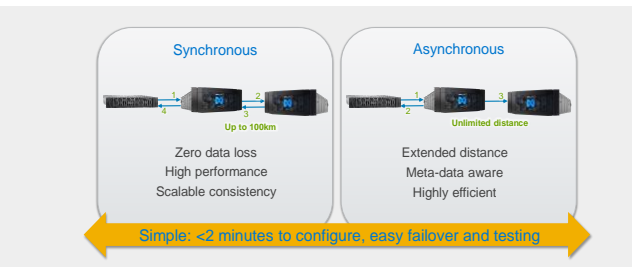
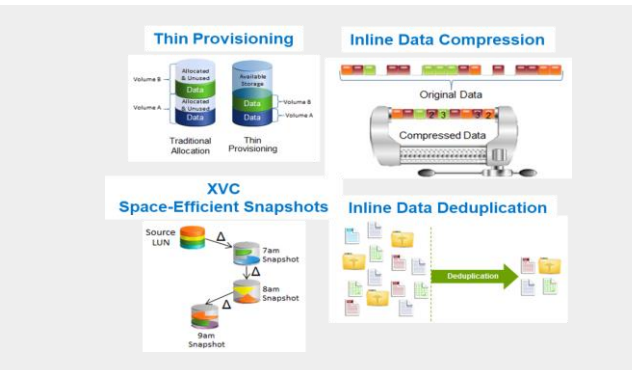
The XtremIO platform is truly unique in its ability to transform your virtual infrastructure and application lifecycle strategies. With unmatched data efficiencies and rich application integration XtremIO X2 provides no compromise copy services and consistent performance.

Increase your agility and efficiency without increasing your physical capacity requirements through the use of XtremIO Virtual Copies and Integrated Copy Data Management. Revolutionize your approach to Dev/Test and all of your data repurposing needs with XtremIO X2.

XtremIO Replication- The Industry's Most Efficient Replication⁶

XtremIO offers extreme flexibility and efficiency by optimizing data availability options to best meet any business requirements. Synchronous and Asynch native replication is available concurrently to cater for mission critical as well as business critical data protection needs, as required by the customer. Synchronous mode provides zero data loss replication between XtremIO X2 systems over distances of ~60 miles / 100 kms (5ms round trip latency). Asynch replication offers operational simplicity by leveraging XtremIO's legendary in-memory snapshots delivering full operational recovery for disaster situations, with RPO's of 30 seconds, even under heavy load and covering limitless distances. In fact, XtremIO X2 replication requires up to 38% less storage for fan-in topologies². Setup and configuration is extremely simple in both cases and is integrated with XVC snaps to ensure flexibility of recovery points in the event of a DR.

Asynch Replication uses always-on inline data reduction services, including compression and deduplication minimizing WAN usage. This significantly reduces WAN bandwidth requirements by 75% or greater³, enabling IT departments to utilize WAN bandwidth for other IT



applications. Additionally, this unique capability of X2 replication allows replication of heavy workloads without compromising RPOs. At no point is there a need to disable replication or any other data service to allow another data service to run. If using synchronous replication and issues arise with the link, the array will merely switch to asynch-mode and continue serving your applications.

Ensuring Quality of Service

In a multi-tenant containerized application and DevOps environment, storage infrastructure is shared among a variety of servers and applications. Whenever an application overloads the storage in such an environment, it can affect other applications sharing that storage infrastructure (noisy neighbors), leading to resource contention and reduced performance for critical applications. XtremIO QoS ensures the service of volumes, CGs and IGs for various enterprise use cases, improving storage resource allocation between multiple workloads and allowing policy-based maximum bandwidth limitations to be configured.

Cloud-enabled monitoring for XtremIO systems

XtremIO X2 also introduces CloudIQ integration enabling administrators to remotely monitor the health and availability of their XtremIO storage infrastructure. CloudIQ provides a single, simple, display to monitor and predict the health of the XtremIO and other Dell EMC storage environments. Customers can, from a single dashboard: see a Proactive Health Score to help reduce and even eliminate risk in their environment; and utilize Predictive Analytics and Anomaly Detection to aid in identifying and avoiding potential problems.

CloudIQ makes it simple to track storage health, report on historical trends, plan for future growth, and proactively discover and remediate issues from any browser or mobile device.

The Dell EMC Future-Proof Loyalty Program

XtremIO X2 is included in Dell EMC's Future-Proof Loyalty Program which is designed to provide our customers with investment protection and with a set of world class technology capabilities to provide value for the entire lifetime of your applications. The Future-Proof Loyalty program is different because it is available to our customers at no additional cost either in terms of higher maintenance price or higher product price. The program includes a 3 year product satisfaction guarantee, hardware investment protection, clear price maintenance, all-inclusive software, a 3:1 data reduction guarantee and a 5:1 storage efficiency guarantee, never worry data migrations, all-inclusive software, flexible consumption models, and cloud mobility, protection and management. Designed to ensure Dell EMC customers feel confident in their Dell EMC purchasing decision. See program full details at www.dell EMC.com/future-proof.



FUTURE-PROOF LOYALTY PROGRAM



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1. Based on Dell EMC internal testing, February 2018 with 10 hours asynch continuous replication run and retention policy of 4 in 4 min.
2. Based on Dell EMC internal analysis, February 2018, with XtremIO asynch replication for fan-in 4:1 central DR site topology.
3. Based on Dell EMC internal analysis, February 2018. Assumes 4:1 data reduction.
4. Based on Dell EMC internal analysis, February 2017, compared to the previous generation XtremIO X1.
5. Based on Dell EMC internal testing/analysis in February 2018 using VDI workloads versus the X1. Actual performance will vary.
6. Based on Dell EMC internal analysis, March 2018.