ASKING THESE 20 SIMPLE QUESTIONS ABOUT ALL-FLASH ARRAYS CAN IMPACT THE SUCCESS OF YOUR DATA CENTER ROLL-OUT

1. **PURPOSE BUILT FLASH SPECIFIC DESIGN:**
   Does the product leverage an advanced and cost effective eMLC architecture that utilizes unique flash capabilities to achieve new levels of performance, endurance, capacity optimization and data protection?
   Why it matters: Single Level Cell (SLC) flash, which stores one bit per internal memory cell supports the highest number of write and erasure cycles while Enhanced Multi Level Cell (eMLC) which stores two bits per cell is more cost effective and offers higher capacity points, but at lower total endurance cycles and at slower write speeds. Customers are seeking an innovative storage solution that can package an enhanced MLC architecture with advanced write abatement techniques (such as global inline data reduction, no garbage collection design and 100% balanced writes across all drives) achieving the superior flash endurance of SLC at attractive eMLC price points for the best of both worlds.

2. **INTEGRATED STORAGE MANAGEMENT STACK:**
   Does the product provide a high performance and totally integrated storage management stack for global data reduction, thin provisioning, copy services and security protection, all at the rated performance levels claimed by the vendor?
   Why it matters: All SSD storage arrays are not the same just because they have the same checklist of features. The traditional approach of software bolted-on to existing hardware cannot achieve the optimization of capacity or the accelerated performance of a tightly integrated hardware/software solution. An integrated architecture also delivers superior operational simplicity with a single intuitive GUI, attains enhanced endurance of the flash media and returns a superior total cost of ownership.

3. **CONTENT AWARE ARCHITECTURE:**
   Does the product provide content aware intelligence for inline data reduction, thin provisioning, copy services, data protection and drive rebuild processes?
   Why it matters: A content aware storage architecture enables greater efficiency in data reduction processes for more than just writes of data but also in creating a content aware, globally deduplicated cache achieving a substantially larger cache size with smaller DRAM allocation. Imagine a system with inline data reduction that
calculates a unique content signature for every 4K data block and inherently spreads that data uniformly across the array providing automatic load balancing for performance and enhanced flash wear level efficiency since the data never gets rewritten or rebalanced in post-processing operations. Additionally, think about a metadata layer that is content aware and enables optimal efficiency of Copy Services (e.g. snapshots and clones). If a drive fails, content awareness speeds rebuilds as only data is recovered and empty blocks of zeros are skipped. Customer selection criteria needs to consider content aware architectures that enhance the reliability and wear leveling of flash drives while delivering non-compromising performance and capacity efficiencies for a greater ROI.

4 SCALE-OUT CLUSTER DESIGN:
Does the product have a scale-out cluster design with the flexibility to modularly start small and grow capacity and performance linearly?
Why it matters: Flash is so fast that no dual-controller architecture can scale performance. Scaling-out controllers in an N-way active cluster is the only way to allow performance to increase in lock step with capacity and ensure that the flash array you invest in today is able to service tomorrow’s application requirements.

5 HIGH AVAILABILITY ARCHITECTURE:
Does the product provide a high availability design with no single point of failure, including N-way active controllers, N+2 redundant SSDs, redundant SAN ports and hot-pluggable power supplies, fans and SSDs?
Why it matters: Business critical databases, applications and VMs require 7/24 on-demand real-time access in today’s business environment. In order to meet the highest echelon of service level agreements (SLAs), customers demand an HA design that can transparently address any failure while maintaining total resiliency without loss of data or service.

6 SUB-MILLISECOND LATENCY:
Does the product provide sub-millisecond latency for fully random 4K I/O operations and deliver consistent maximum performance all the way up to high levels of capacity utilization for any characterization of mixed read/write workloads?
Why it matters: Latency is a measure of how long it takes for a single I/O request to complete from the application’s viewpoint. This is a key metric for time sensitive databases and OLTP applications needing near instantaneous response time acknowledgments for reads and writes. Sub-millisecond latency translates into consistent throughput to meet customer expectations and handle the random I/O patterns of high transaction oriented applications.

7 SUSTAINABLE IOPS AND BANDWIDTH PERFORMANCE:
Does the product deliver consistently high performance for mixed read/write workloads all the way up to 100% capacity utilization?
Why it matters: Many flash arrays experience performance degradation when fully loaded and it is important to consider the array’s capability to sustain consistent performance all the way to 100% capacity utilization.
100% GLOBAL INLINE DATA REDUCTION:
Does the product provide 100% global inline data reduction for capacity optimization with performance that actually accelerates as data reduction rates increase?
Why it matters: Inline data reduction is the removal of redundancies from data before it is written to storage. Performing this process inline, and globally across the array translates into fewer writes to the SSDs which increases SSD endurance and eliminates the resource contention of capacity and performance degradation associated with post process data reduction processes.

DEDUPLICATION AWARE COPY SERVICES:
Does the product provide deduplication aware snapshots and clones while delivering the same high performance achievable from their parent volumes?
Why it matters: Snapshot implementations often consume significant additional capacity for volume metadata with each snapshot taken, incur heavy performance penalties when deleting snapshots, and see dramatically lower performance on snapshots than on the parent volume from which they were derived. A flash optimized snapshot implementations should leverage inline data reduction to prevent metadata bloat, and require no management overhead, no capacity overhead and cause no I/O performance penalty in reads, writes, or latency.

USABLE CAPACITY EFFICIENCY:
Does the product provide a raw to usable capacity ratio exceeding 70% to deliver maximum capacity utilization?
Why it matters: Even though the costs of flash memory are coming down, it is still relatively expensive and a precious resource that needs to be capacity optimized. It is important to seek out the storage product that achieves the highest levels of capacity optimization through more efficient data protection algorithms, optimal thin provisioning techniques, efficient metadata structures, and without requiring any additional SSDs as hot spares.

THIN PROVISIONING OPTIMIZATION:
Does the product provide a thin provisioning architecture with granular 4K allocation sizes and no performance loss?
Why it matters: Thin provisioning enables volumes to be configured to any size while deferring the actual allocation of capacity until data is written, thus improving the capacity utilization of the array. Allocating space to volumes in granular 4KB chunks achieves optimal space management of the storage pool versus traditional architectures using larger chuck sizes, or which do not support thin provisioning. Customers should seek thin provisioning architectures that do not have performance penalties and which do not fragment data or require garbage collection processes. A well architected thin provisioning system enables customers to defer purchases of more storage until needed, and will not reduce performance compared to “thick” provisioned volumes.
12 **COMPREHENSIVE VAAI INTEGRATION THAT LEVERAGES INLINE DATA REDUCTION:**

Does the product provide support of all VMware VAAI commands enabling the array to offload and accelerate common vCenter tasks and deliver instant VM clones with rapid provisioning to rollout or upgrade hundreds of VMs in minutes?

Why it matters: Only systems with truly inline data reduction, efficient in-memory metadata management techniques, and that fully integrate the VMware VAAI command set (Block Zeroing, XCOPY, ATS, UNMAP) can off-load from the host common VMware provisioning tasks such as delivering instant cloning of VMDK files and rapid formatting of VMFS volumes of any size with a simple update to the array’s metadata tables. This integration enables unprecedented data center agility with simplified management.

13 **ENTERPRISE ECOSYSTEM INTEGRATION:**

Is the product well integrated into a rich ecosystem of enterprise products and services such as converged infrastructure, object storage, deep monitoring and analytics, application data protection and workflow optimization, multi-pathing software, and active-active data centers?

Why it matters: Wide and deep integrations into the IT ecosystem offer customers the freedom of choice to leverage a variety of technologies to meet their business needs. Point products lacking the breadth and depth of integrations force customers to risk their mission with new, unproven technology or manage storage in silo-ed “islands”.

14 **CONTENT AWARE REBUILDS:**

Does the product provide upon a drive failure, the capability to automatically balance new writes across all other drives and does the rebuild only address data written to the drive and not blank space in order to accelerate the rebuild speed?

Why it matters: Traditional RAID techniques take significant time to rebuild a failed SSD because every block has to be recovered. A content-aware architecture recognizes the difference between user data and empty space and only rebuilds the data. Dynamic load balancing during a rebuild distributes writes across all active drives achieving accelerated rebuild performance and administrative productivity savings.

15 **GREEN EFFICIENCIES:**

Does the product provide a small footprint, power and cooling efficiencies along with a feature set that optimizes capacity consumption?

Why it matters: The greater the optimization of the storage capacity, the less hardware is required to meet the customer’s storage objectives which translates into less total data center space and lower power/cooling requirements. Customer criteria needs to consider greater raw to usable storage efficiency, data protection efficiencies without traditional RAID overhead, optimal snapshot/clone utilization instead of physical copies, elimination of idle spares in the configuration with rebuild to any available space, scale-out design with linear scalability, 100% inline data reduction for capacity optimization and thin provisioning creating “pay as you grow” green efficiencies.

16 **INDUSTRY STANDARD HARDWARE DESIGN:**

Does the product leverage a commodity hardware design for rapid adoption of the latest technology and flexibility of choice while delivering attractive total cost of ownership (TCO)?
Why it matters: Elimination of proprietary hardware translates into flexible open architectures with the ability to ride the wave of progression to next generation hardware technologies and implement solutions without the risks and premium pricing of vendor lock-in. Vendors who leverage industry standard commodity platforms while avoiding proprietary boards, ASICs, and FPGAs are able to deliver the greatest value for the dollar by leveraging the commodity price curve, while focusing their engineering efforts on intelligent and sophisticated storage management software capabilities that achieve compelling CapEx and OpEx savings.

17 NETWORK STORAGE CONNECTIVITY OPTIONS:
Does the product provide connectivity for both 8Gbps Fibre Channel and 10Gbps iSCSI to provide flexibility of choice and future proofing the network storage investments?
Why it matters: Protection of existing SAN topologies are key attributes for selection criteria of storage solutions so that customer investments are protected but going forward it is important to provide the flexibility to deploy new protocols to meet the requirements for on-premise and distributed data centers along with cloud based strategies. Customers should have the ability to purchase pre-packaged storage solutions that automatically provide the capability to mix and match the protocols of choice to meet the desired interconnect strategy of the enterprise environment today and into the future.

18 OPERATIONAL LIGHTS OUT DESIGN:
Does the product provide operational simplicity with no complex configuring, no performance tuning and no administrative maintenance ever required for maximum productivity and dramatic lowering of the TCO?
Why it matters: Industry studies show that OpEx is two thirds or more of the typical IT budget and becoming a larger percentage of IT costs. This makes it paramount to seek productivity increases of operational staffing and administration to manage storage systems. A single simplified GUI and ease to install and manage storage with minimal operational intervention is clearly becoming a driving force for customer’s selection criteria of storage solutions for attractive TCO advantages. There should be no complex configuration or tuning required, no setting up of RAID and all an administrator should have to do is simply create volumes and map them to hosts.

19 INTEROPERABILITY QUALIFICATION AND CERTIFICATION:
Does the product provide comprehensive interoperability testing, qualification and certification with a wide range of industry components and operating environments (such as Server OS, multipathing software, clustering software, Network Adapters and Switches) for a total solution that offers flexibility of choice and future proofing?
Why it matters: Customers demand the confidence of knowing the storage arrays in their data center have gone through rigorous end-to-end interoperability testing spanning an extensive range of configurations of hardware platforms and operating system software. An all inclusive vendor qualification process enables customers to rapidly deploy the storage solution in their data center while saving time, minimizing risk and simplifying operations. It is important to evaluate the resources and
investment made by the storage array vendor to address comprehensive testing with advanced testing tools that replicate real world environments to help ensure the highest level of customer satisfaction.

WORLD CLASS SERVICE AND SUPPORT:
Does the product provide a global support organization providing 7/24 call home monitoring, alerts, diagnostics and troubleshooting while eliminating support risks with startup vendors?

Why it matters: Service and support is always ranked as one of the highest criteria for customer selection of IT solutions. Customer criteria needs to consider best in class professional services for the entire lifecycle – addressing comprehensive services for the implementation and on-going management of the storage solution including global 7/24 call center support with skilled expertise for secure monitoring and early warning systems coupled with responsive troubleshooting and technical support.

If a supplier cannot answer yes to all of these simple questions, you should only consider XtremIO for your storage requirements.