FLEXIBLE ELASTIC SCALING WITH STABILITY AND WITHOUT COMPROMISE

INTRODUCTION

This Server StorageIO® Industry Trends Perspective report looks at common issues, trends, and how to address different application server storage I/O challenges.

In this report, we look at WekaIO Matrix™, an elastic, flexible, highly-scalable easy to use (and manage) software-defined (e.g. software-based) storage solution.

Matrix is a new storage solution that:

- Installs on bare metal, virtual or cloud servers
- Has POSIX, NFS, and HDFS storage access
- Adaptable performance for little and big data
- Tiering of flash SSD and cloud object storage
- Distributed resilience without compromise
- Removes complexity of traditional storage

WHO THIS APPLIES TO

Environments with multi-dimensional server, storage and I/O management challenges. This includes applications with diverse performance, availability, capacity and economic (PACE) needs, who also require scaling with ease, as well as stability.

- Electronic Design Automation (EDA)
- Life science and Genomics research
- Fraud and revenue loss prevention
- Media & Entertainment pre/post production
- Energy, oil, gas and mineral exploration
- Real-time, click and log analytics
- Security surveillance and image analysis
- Web 2.0, on-line content and cloud services
- Transactional and IoT hub gateways
- HPC, modeling, simulation, forecasting

BACKGROUND

There are many data infrastructure server, storage, and I/O challenges (problems) facing various environments. These multi-dimensional problems are tied to different applications, along with their various workload characteristics and service requirements. Application attributes include Performance, Availability, Capacity, Economics (PACE), Service Level Objectives (SLOs) and Quality of Service (QoS).

Additional problems across different environments include:

- Different size, type, and complexity of applications
- Application resource needs (hardware, software)
- Aggregation (consolidation) causing aggravation (bottlenecks)
- Proliferation of different types of storage for various workloads
- Increasing server, storage, I/O hardware and software overhead footprints
- Time spent waiting for storage resources to be provisioned for use
- Lack of cloud like resiliency, low-overhead, elasticity, cost-effective scaling

EXISTING STORAGE SOLUTION CHALLENGES

With applications generating, processing, moving and storing more data, it is time to rethink server and storage I/O problems. This means using flash SSD, CPU cores, DRAM memory, and standard networks in new ways. Rethinking includes how, when, and where availability, resiliency, durability, and data protection occurs.

A common problem IT organizations face when evaluating traditional and new storage solutions (including cloud services), is understanding which ones are best suited to their environment application workload need. Some storage solutions are optimized for performance. For example, focusing on high I/O activity rates (reads, writes, gets, puts, IOPs, TPS[1]) or low latency. Meanwhile, other solutions are optimized for large data movement (bandwidth, throughput).

Another variation is some storage solutions are optimized for working with small data files and objects, while others are optimized for large big data files and objects. Besides performance, some storage systems are optimized for high-availability, while others are high-capacity, low-cost with reasonable resiliency.

Table-1 shows as an example various types of storage systems architected for different application environments. Some of the storage systems in table-1 can result in increased compromises or introduce scaling with instability (problems) across performance, availability, capacity, and economics for different applications. In other words, a typical result is increased islands of technology, pockets of problems, compromise, complexity, and cost.

Table 1 – Various Storage Systems Optimized For Different Application Workloads.

	Hypervisor, CI, HCI, OS, SDS focus	SAN / NAS systems or appliances	Scale-Out NAS, file systems, HPC	Bulk, Cloud Object systems and services
Usage	VDI, Virtualization, general applications, ROBO, smaller environments	From general purpose to mission critical or specific applications, varies by system	Large files and objects for high bandwidth big data, video, Energy, EDA, life science, HPC	From general purpose to HPC to analytics to protection (backup, archive, snapshots)
Benefits	General purpose workload, ease of use	General purpose shared storage	Support large number of files and objects	Low-cost, high-capacity durable, object access
Caveats	Limited or complex scaling[2], OS or hypervisor-centric Storage may be limited to HCI servers	Cost, Scale within "box," PACE tradeoffs, some cause compromise, a mix of block, file or unified access.	Not optimized for smaller files, objects and mixed I/O. Availability protection overhead with scaling	Usually not optimized for performance or updates, may need extra gateway or other software for file access

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[1] Transactions per Second for databases (TPS); CI = Converged Infrastructure; HCI = Hyper-Converged Infrastructure; HPC = High Performance Compute, High Productivity Compute; NAS = Network Attach Storage (file based access); OS = Operating System; PACE = Performance Availabity Capacity Economics; SDS = Software-Defined Storage including "tin-wrapped software" (e.g. software with hardware appliance).

[2] Scaling caveats range from performance, availability, capacity space, size, ease of use.

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Instead of simply cutting cost and compromising to meet budget needs, new approaches are required that find, fix, and remove complexity and overhead while boosting productivity. What this means is by eliminating complexity and overhead, more data and application performance can be supported at a lower cost.

To address data infrastructure and server storage I/O problems, today's storage solutions should:

- Reduce overhead and storage provisioning time
- Have a small footprint (hardware, software, facilities)
- Adapt performance to different applications
- Support POSIX, NFS, and HDFS storage access
- Enable cloud-like experience (easy, elastic, scalable)
- Eliminate compromise and reduce complexity
- Streamline the number and types of storage systems

Who and What is WekaIO

Headquartered in San Jose, California, WekaIO is backed by leading venture capital firms including Walden Riverwood Ventures, Norwest Ventures and Qualcomm Ventures. WekaIO has a significant intellectual property (IP) portfolio including over 30 patents issued, submitted, or identified.

Core technology is WekaIO Matrix, a multi-dimensional, scalable (with stability), adaptable, easy to use, elastic, and resilient, software-based storage solution.

WekaIO Matrix - Multi-Dimensional Scalable Storage

WekaIO solves multi-dimensional data infrastructure and server storage I/O problems with a software-based, hardware-agnostic storage solution called Matrix. Being software-based, Matrix can be deployed on bare-metal, virtual machines or cloud instances. Besides where deployed, Matrix can also be configured for aggregated HCI (e.g. co-exist on the same server with applications) or as a disaggregated environment without having to change your applications. WekaIO Matrix combines high performance for mixed workloads (big, small, reads, and writes, random, sequential) and requires zero external hardware footprint.

With a patented, distributed data protection scheme along with user definable snapshots, WekaIO Matrix and its flexible MatrixFS file system provide enterprise-class resiliency and availability without compromise or the overhead associated with traditional storage solutions.

Being multi-dimensional, Matrix combats complexity, eliminating overhead and bottlenecks resulting in a smaller hardware, software, and management footprint versus traditional storage solutions, resulting in a lower total cost of ownership.

Matrix has been designed to provide high performance regardless of scale size. Performance scales up by allocating more CPU cores to the software and scales out by adding server nodes. The software-based storage solution delivers linear performance from six to several thousand nodes across mixed workloads. This means that both small, random I/O as well as large file processing performance with low latency are not a problem.

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Note that storage capacity is scaled by adding fast SSDs inside the nodes, adding more nodes and by leveraging integrated tiering across object and cloud storage such as AWS S3.

WekaIO Matrix masks the complexity of optimizing performance, availability, and capacity across different application workloads. What this means is that you can deploy HPC class storage without having to be a software engineer or have an army of students maintaining the system. Meanwhile, Matrix easily supports general purpose big and small file mixed application workload needs by removing bottlenecks and other server storage I/O problems.

WekaIO Matrix enables dynamic and independent scaling of performance without the need for scores of traditional storage systems. The result is less underutilized storage, simplified management, reduced complexity that also remove costs. This means Matrix enables cloud like ease of management, rapid provisioning to reduce deployment time along with elastic scaling.

The Server StorageIO view: What this all means

Data infrastructures need fast servers, I/O, storage, and software to support fast applications with diverse, multi-dimensional needs. This means applying new solutions to remove common problems, reduce complexity and eliminate barriers to productivity. WekaIO Matrix is a solution that has the flexibility to adapt to your environment and applications.

WekaIO Matrix addresses common IT storage problems by providing:

- Storage that adapts to your environment without having to change your applications
- Rapid storage provisioning to reduce time to get new workloads deployed
- Cost savings by removing complexity while enabling elastic cloud-scale capacity
- Resiliency and durability via distributed data protection.

Visit www.weka.io to learn more.

ABOUT THE AUTHOR
Greg Schulz is Founder and Sr. Consulting Analyst of independent IT advisory consultancy firm Server StorageIO and UnlimitedIO LLC (e.g. StorageIO®). He has worked in IT for an electrical utility, financial services, and transportation companies in roles ranging from business applications development to systems management, architecture, strategy, performance, and capacity planning. Mr. Schulz is the author of the books "Software Defined Data Infrastructures Essentials" (CRC Press), as well as Intel Recommended Reading List books "Cloud and Virtual Data Storage Networking" and "The Green and Virtual Data Center" via CRC Press, along with "Resilient Storage Networks" (Elsevier). Greg is a Microsoft MVP and VMware vExpert. Learn more at www.storageio.com and www.storageioblog.com on Twitter @StorageIO.

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