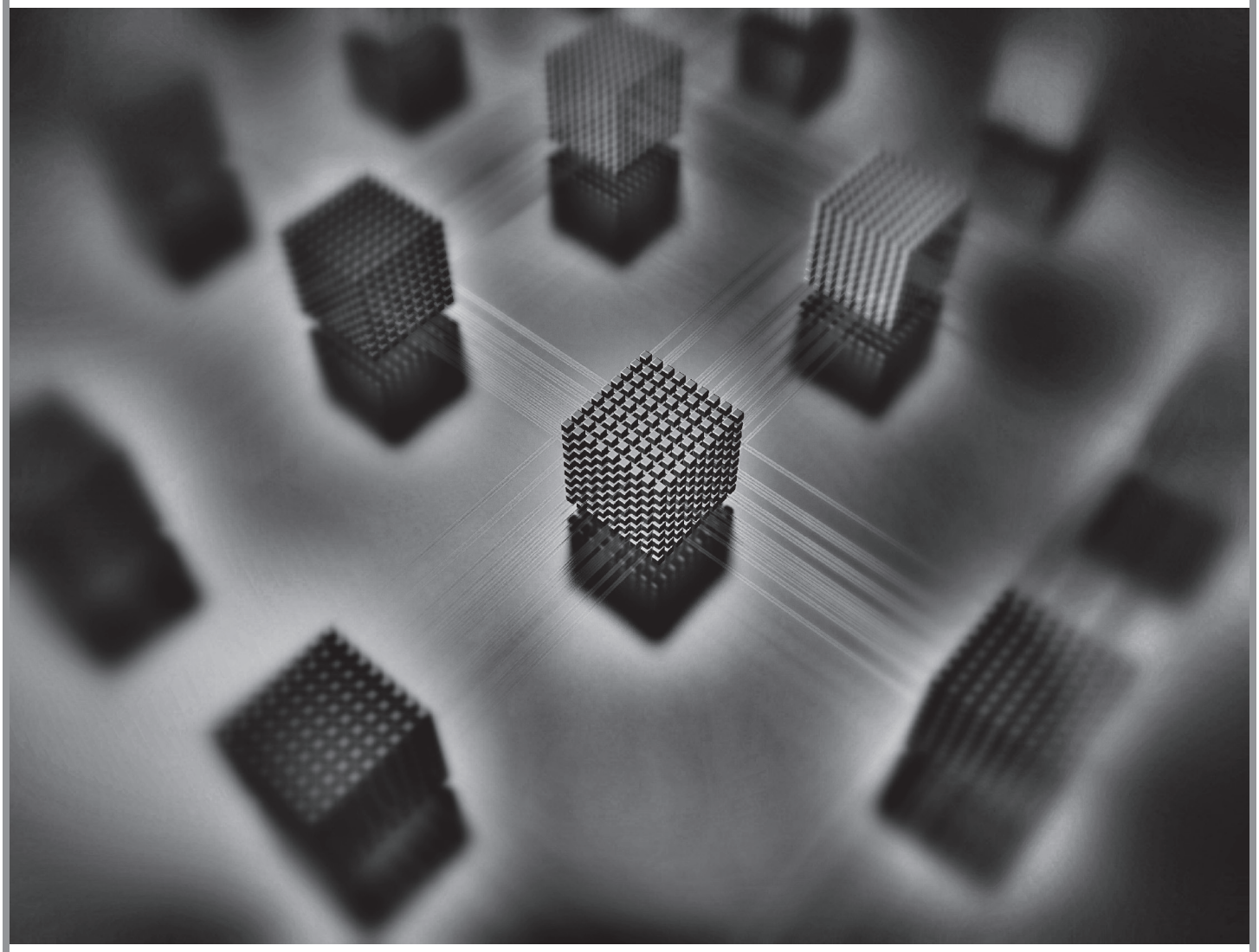
WHITE PAPER

Realizing Business Value in a Virtual Storage World



By Jon Toigo

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INTRODUCTION

Server virtualization has been a widely adopted strategy since its introduction to the distributed computing world in 2002. Like most "technology revolutions," the evangelists of server virtualization technology emphasized the return on investment that would accrue to server consolidation. Converting physical machines into virtual machines, then aggregating those VMs onto fewer physical hosts, would reduce CAPEX budgets almost immediately while bending the OPEX cost curve over time. Leading analysts claimed that, by 2011, the cost of IT in heavily virtualized environments would be significantly less.

Clearly, the promises of huge cost-savings have yet to be realized. A big reason has been the impact of server virtualization and consolidation on network and storage infrastructure.

In many firms, virtualization projects are stalling as decision-makers reassess the value case that supported the effort from the outset.

Leading analysts are now projecting that storage capacity demand will grow by as much as 300 to 650% annually over the next year or two, driven by a need to retire legacy storage and to replace it with software-defined cobbles that typically support only a single hypervisor stack. These "software-defined storage" solutions from leading server hypervisor vendors begin with a requirement to field a minimum of three identical storage "nodes" – each a replica of the other two – behind each hypervisor host. Add to that 300% cost increase additional capacity to store disaster backups, archives and other data copies and, even with tactical technologies for squeezing data (such as de-duplication and compression), the capacity demand trend line spikes high and to the right for the foreseeable future.

In many firms, virtualization projects are stalling as decision-makers reassess the value case that supported the effort from the outset. A more sober review is being made to determine how server virtualization can help companies achieve cost-containment, risk reduction and improved productivity – the three components of a real business value case for any technology. Not surprisingly, this reassessment is providing considerable impetus for companies to consider technology from industry innovators such as Tintri Inc.

THE PROBLEM IN A NUTSHELL

Early server virtualization efforts targeted the "low-hanging fruit" of the distributed server infrastructure: file servers and web servers that had proliferated since the 1990s in most organizations. These low traffic servers represented little challenge in terms of consolidation, even for the comparatively low sophistication hypervisor software of the day. The light I/O traffic to and from virtual machines created from file and web servers was accommodated readily using existing network and storage (LAN and SAN) interconnects.

However, as virtualization initiatives progressed and workloads with more demanding I/O characteristics were consolidated into fewer physical hosts, problems began to appear that challenged the optimistic assumptions about cost savings expected from server virtualization. A major problem came in the form of application I/O congestion, which in many cases slowed the performance of virtualized applications.

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Many strategies were suggested to address the performance issues, from expensive upgrades to virtual server hosts (adding I/O adapters to increase the number of connections to each physical host), to adding generous amounts of flash memory to servers in order to buffer and cache I/O thereby "spoofing" latency issues, to offloading certain tasks to intelligent array controllers using specialized commands (for example, VMware's vStorage API for Array Integration or VAAI). None of these "solutions" actually fixed the problem, however. They did change the cost dynamics of server virtualization, negating many of the cost savings expected from the strategy.

Two years ago, leading hypervisor vendors began calling for the wholesale "rip and replacement" of "legacy" storage infrastructure, substituting their own direct-attached storage paradigm – so-called software-defined storage – in its place. SDS was predicated on the questionable assumption that storage I/O congestion was the source of application performance issues, despite the fact that in many cases I/O congestion was occurring ahead of the storage I/O process. Tintri Inc. was ahead of most storage technology vendors in questioning the accuracy of the causal argument cited by SDS advocates.

Tintri correctly observed that a change was needed in the file system to address I/O congestion. Rather than driving the undifferentiated file requests from all virtual machines into the same interconnect (resulting in the so-called I/O Blender Effect), the Tintri approach was to refocus the file system on virtual machines as the objects of management. Doing so enabled Tintri to funnel the I/O traffic from different VMs into different VM-specific I/O channels. In that way, both granular caching and quality of service throttling could be applied to workloads based on workload behavior, priority and sensitivity to latency. The strategy yielded tremendous efficiency improvements according to Tintri customers.

From this technology innovation, which Tintri has embedded on its VMstore appliances, Tintri has redefined the business value case for virtualized infrastructure.

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COST-CONTAINMENT VALUE

Tintri's innovative approach to I/O management from the VM perspective greatly simplifies the storage management task. On Tintri's hybrid-flash arrays, the system automatically provisions both flash and disk storage capacity, and interconnect bandwidth, to each VM based on workload behavior. Tintri also offers all-flash arrays and offers a management system, Tintri Global Center, to allow administrators to manage and migrate workloads to hybrid-flash or al.l-flash arrays as appropriate. Even virtualization administrators with limited knowledge of storage technology can do an effective job, according to Tintri.

The above goes to an overall reduction in storage administration, management and other costs related to OPEX. This helps to offset, according to Tintri, the CAPEX costs of their solution, which requires consumers to purchase proprietary technology from the vendor. Tintri engineers observe that the switch from generic, file based data management, to their much more efficient VM-centric data management requires custom hardware implementation – although they are quick to point out that the value of their kit is driven by their proprietary software rather than by hardware components.

Justifying their case that VMstore appliances deliver a net OPEX cost

reduction as well as some CAPEX improvements over other proprietary hardware rigs are two additional attributes. For one, with VMstore appliances, the virtual machines of different hypervisors can be stored on the same appliance. That Microsoft Hyper-V virtual machines and VMware virtual machines can share the same infrastructure is actually a significant advantage over the proprietary software-defined solutions from either server virtualization vendor. Instead of managing different infrastructures for different hypervisor workload, Tintri delivers a proverbial "one stop shop."

Another benefit of the Tintri storage approach, according to the company, is the ability to share services across the infrastructure, including cloning, snap shots, and de-duplication. Individual VMs, even those from different hypervisors, share the same space and the same block optimization and copying services.

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More than one consumer refers to Tintri's VMstore as a "set it and forget it" infrastructure. "Phone home" services ensure that maintenance is performed as needed. And analysis tools that Tintri adds to the management tools provided by the hypervisor provide a robust set of real time and trend data that can be used to optimize infrastructure over time.

RISK REDUCTION

Narrowly conceived, risk reduction refers to the avoidance of both catastrophic failure and protracted service interruption of a technology infrastructure or service. Storage is among the most critical infrastructure components in contemporary IT, especially given the need for uninterrupted access by applications and decision makers to the data required to support business operations.

Tintri argues that its solution delivers broad and meaningful infrastructure availability and data protection capabilities that more than justify the acquisition of the technology from a risk reduction value perspective. Handling VMs separately enables snapshots and other continuous data protection services to be applied to individual VMs based on workload criticality and data change rates.

For those applications with short recover time requirements or exacting recovery point objectives, Tintri enables rolling snap shots to be implemented with as short as 1 minute snapshot increments. Replication between appliances is readily implemented and asynchronous replication extends the data protection and data availability service between appliances separated by distances greater than 70 kilometers.

From an availability perspective, the Tintri risk reduction narrative is solid. Investment risk is another dimension of this value case component. Since Tintri is a comparative newcomer to the market, only time and market adoption trends will determine the risk of investment associated with the Tintri solution. The same may be said of most software-defined storage solutions that are being pressed into service by hypervisor vendors.

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IMPROVED PRODUCTIVITY

In addition to cost containment and risk reduction, the third component of a full business value narrative considers the improved productivity that is enabled by the technology under consideration. Clearly, the Tintri approach offers a mechanism for improving the efficiency of storage I/O. It does so elegantly, in three straightforward steps:

1. 100% of writes from every virtual machine are made into data protected flash storage., which is the primary tier of storage.

2. On its hybrid-flash arrays, "cold" blocks are copied to hard disk storage when appropriate.

3. "Evicted" cold block data space is reclaimed automatically.

Hence, little additional administrative burden is placed on virtual server administrators, enabling them to perform other tasks. Presumably, this increases the productivity of IT administrators and the performance and agility of IT operations overall.

If, as many consumer testimonials suggest, the Tintri technology improves application performance meaningfully, then this might enable

more work to be performed by applications and workers in the organization. This is difficult to quantify and the actual impact on organizational productivity will likely vary from one company to the next.

Bottom line: Tintri enables greater application performance and greater worker productivity than many other forms of storage infrastructure when used with virtual server technology. What companies make of this performance gain is difficult to predict.

CONCLUSION

In the final analysis, the capabilities that Tintri brings to storage infrastructure management and VM performance acceleration combine with a set of data protection services to deliver a robust business value case to companies that are already heavily invested in server virtualization. Tintri's unique VM-focused data management scheme qualifies the company as a thought leader in storage optimization for virtual server environments.

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Check out Tintri's website to learn more about Tintri VMstore.

Jon Toigo is a 30-year veteran of IT, and the Managing Partner of Toigo Partners International, an IT industry watchdog and consumer advocacy. He is also the chairman of the Data Management Institute, which focuses on the development of data management as a professional discipline. Toigo has written 15 books on business and IT and published more than 3,000 articles in the technology trade press. He is currently working on several book projects, including The Infrastruggle (for which this blog is named) which he is developing as a blook.