It's All About the App: Application-Centric Systems Management

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*IT & DATA MANAGEMENT RESEARCH,
INDUSTRY ANALYSIS & CONSULTING*

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Introduction

Business staff is not interested in the technical details and explanations of why their application fails to perform adequately. When emails are delayed due to Exchange performance problems, the productivity of the entire organization is impacted. When customer or patient records are unavailable because of storage capacity issues, financial and even health consequences can be dire. Downtime of online storefronts – no matter the root-cause – can quickly threaten the reputation or even the survival of an ecommerce-driven business. Therefore, a modern approach to systems management is required where the entire stack, consisting of applications, databases, virtual machines, physical hosts, datastores, LUNs and storage arrays, must be managed in an application-centric manner. ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) research has shown that the traditional siloed approach to systems management is no longer viable and that technical issues must be evaluated and qualified based on their relevance to overall application performance and reliability. In short, application context is key when it comes to modern systems management.

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This cross-silo approach to systems management serves two key goals:

- **Fast time to problem resolution:** Enable system administrators to rapidly respond to angry phone calls from business staff complaining about their applications being unresponsive or unreliable. When these calls come in, IT operations staff should be able to log into their dashboard and diagnose application performance from the virtual machines involved, right down through the host, cluster and datastore to the LUNs on the physical storage.

- **Proactive problem prevention:** Prevent angry phone calls from the get-go by configuring intelligent application-specific warnings and alerts that provide storage, network, server and virtualization administrators with the context required to gauge the impact of systems issues on application health. For example, storage administrators should receive a warning well in advance, before the performance decrease in a SAN array negatively impacts a business application. Proactively resolving IT issues, instead of waiting for end users to open up tickets through the corporate service desk can significantly reduce the strain on the IT organization.

Infrastructure health must always be monitored and managed within the context of the applications that are directly and indirectly affected. Therefore, enterprise IT today must shift its resource focus, with SLAs attached to individual storage, network and server components, toward a new approach that eliminates traditional silos and is radically application-centric. Currently, companies of any size and vertical notice the importance of adapting their processes, culture, organizational structure and technology to accommodate a much more application-centric approach. This EMA white paper will examine the tooling required to turn systems management into an application-driven discipline.

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Application-Aware Infrastructure Monitoring and Management

For IT operations to ensure application SLAs, it is essential for systems management solutions to "know" and monitor every systems component – server, storage, network, security, and database – that affects application health. This means that when system administrators schedule maintenance tasks, upgrade data center components or conduct troubleshooting, they must always be aware of the application impact of their actions. Therefore, they must have monitoring and management tools available that present them with the application impact of their actions. In order to represent a 360-degree view of the entire data center, systems management software must support a vast array of heterogeneous hardware platforms – servers, storage, and networking – and software components – including databases, middleware, hypervisors, operating systems and security software.

Storage I/O, the Key Bottleneck in Today's Data Center

Storage capacity planning, provisioning and management cause an incredible amount of pain within the modern data center. EMA research has shown that almost one quarter of enterprises are buying more storage to resolve performance problems, when intelligent storage management could resolve these issues without requiring additional CAPEX.

The underlying problem is the lack of application awareness of today's enterprise storage infrastructure. SANs are neither application-aware nor do storage administrators possess the management tools necessary to quickly determine the application impact of a certain spindle, array or LUN. On the server side, virtual machine administrators typically lack the visibility into what is "underneath" their data stores, in terms of storage hardware. Therefore, virtual machine placement often does not sufficiently consider the performance or capacity characteristics of storage, which can lead to unanticipated performance issues caused by noisy neighbors or inefficiently utilized storage hardware. EMA research illustrates the incredible waste that is caused by storage being managed in a mostly application-unaware manner, where overprovisioning (in both disk space and storage I/O capacity) is used as an insurance policy against storage performance problems.[1]

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Application-Centric Management of Servers, Hypervisors and Virtual Machines

Like storage, virtual machines must be managed within the context of their importance to the applications that depend on them. Physical servers – including blades and rack – typically come with their own management tools, such as HP Insight Control, Dell OpenManage or IBM Systems Director. These tools are insufficiently aware of the application workloads that are deployed or will run on the virtual machines hosted on the managed server hardware. This blindness to application and virtualization context can lead to SLA violations that are caused by server administrators conducting their daily management tasks. In today's highly virtualized environments, IT operations require server management software that offers a single pane of glass for managing server hardware, hypervisors and

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[1] *Demystifying Cloud* (EMA Research, 2013):
http://www.enterprisemanagement.com/research/asset.php/2440/Demystifying-Cloud

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virtual machines, while providing context regarding the application impact of any management tasks. This level of insight is specifically important when placing new workloads or when rebalancing existing application environments.

EMA research has shown that multi-hypervisor strategies are prevalent and private cloud adoption is a key catalyst for adopting multiple hypervisors (see charts 1 and 2). Therefore, it is essential for systems management software to be able to provide a single interface for multiple hypervisors, enabling customers to optimally take advantage of the cost, performance and feature characteristics of the individual hypervisor platforms available in the market place.
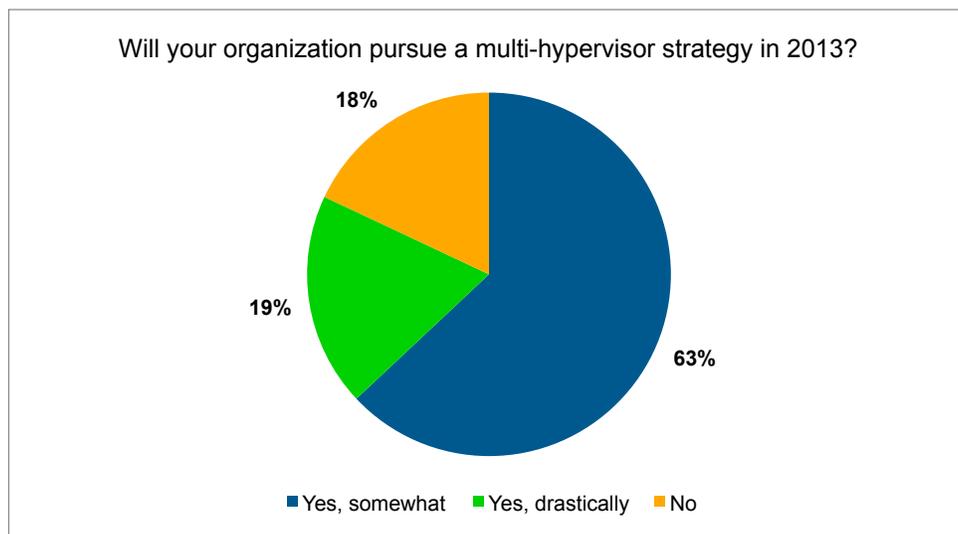
Will your organization pursue a multi-hypervisor strategy in 2013?

- 18%
- 19%
- 63%

■ Yes, somewhat ■ Yes, drastically ■ No

Chart 1 - Adoption of Multi Hypervisor Strategies

Will your organization further pursue its multi-hypervisor strategy in 2013?

Yes, drastically: 13% / 33%
Yes, somewhat: 68% / 51%
No: 19% / 16%

(0% 10% 20% 30% 40% 50% 60% 70% 80%)

■ Completed the first stage of our private cloud deployment
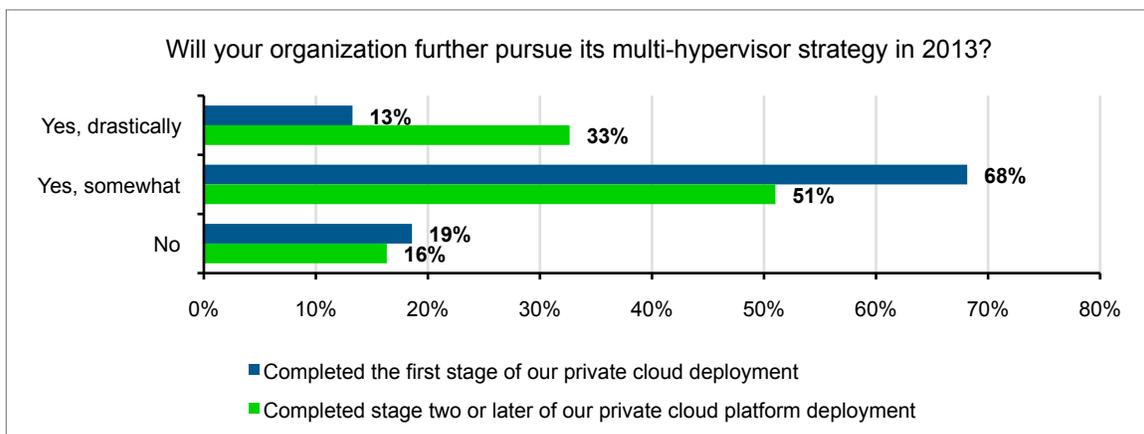■ Completed stage two or later of our private cloud platform deployment

Chart 2 - Cloud as the Catalyst for Multi Hypervisor Strategies

When placing or moving application environments, it is critical for systems management tools to be able to show the performance and capacity impact on the target infrastructure.

General Requirements for Effective Systems Management

When selecting application-centric systems management solutions, there are a few more aspects to consider:

Contextual visualization for faster root cause analysis: To determine the root cause of a specific application or infrastructure issue, it is essential to be able to view the actual problem within the context of what else is going on inside the data center infrastructure. For example, would it not be tremendously helpful to be able to view all software and hardware components that impact the performance of the corporate intranet? This would allow the systems administrator to determine whether the root cause for the intranet's sluggish performance can be found in a stuck SharePoint process, an operating system that is out of memory or simply the fact that more CPU cores are needed.

Agentless is better: Agents require maintenance and regular upgrades. Failing agents or administrators forgetting to install and test management agents often results in virtual machines running without the required agents present. The lack of information caused by the absence of agents can create performance, capacity and security issues, as system administrators make capacity management and application placement decisions based on incomplete knowledge of the overall environment. Therefore, agentless systems management solutions that automatically discover changes to the data center infrastructure topology are the preferable solution.

Out-of-the-box usability and customizability: When deploying a systems management solution, it is essential to achieve rapid time to value, without the need for professional services or internal staff time for setup and configuration. Many traditional systems management tools require complex integration procedures to provide a single pane of glass across the application stack. EMA recommends looking for such tools that are pre-integrated and delivered in a way that does not require lengthy implementation and integration projects. Once the initial setup is complete and IT operations are beginning to reap the benefits of the new software, there should be room for simple customizations that do not require extensive coding. For example, in addition to the vendor-provided set of task-centric dashboards, customers should be able to easily create new dashboard views that are driven by their own queries. The new software should allow system administrators to assemble these queries through a visual interface, without having to learn yet another scripting language.

Capacity management: EMA research has revealed capacity management as the biggest pain point preventing optimal private cloud ROI (see chart 3). Too many organizations still regard capacity management as a static and spreadsheet-driven discipline, conducted once or twice per year. This approach is no longer viable within today's massively heterogeneous data centers and has to be replaced through near real-time capacity planning based on actual workload characteristics and performance requirements under daily loads.

Which Data Center Management automation disciplines constitute the main pain points preventing your organization form realizing optimal cloud ROI?

Discipline	Value
Capacity management	36%
Operations analytics	34%
Risk management	34%
Compliance management & auditing	32%
Asset management	22%
Chargeback	22%
Showback	20%
None of the above	12%
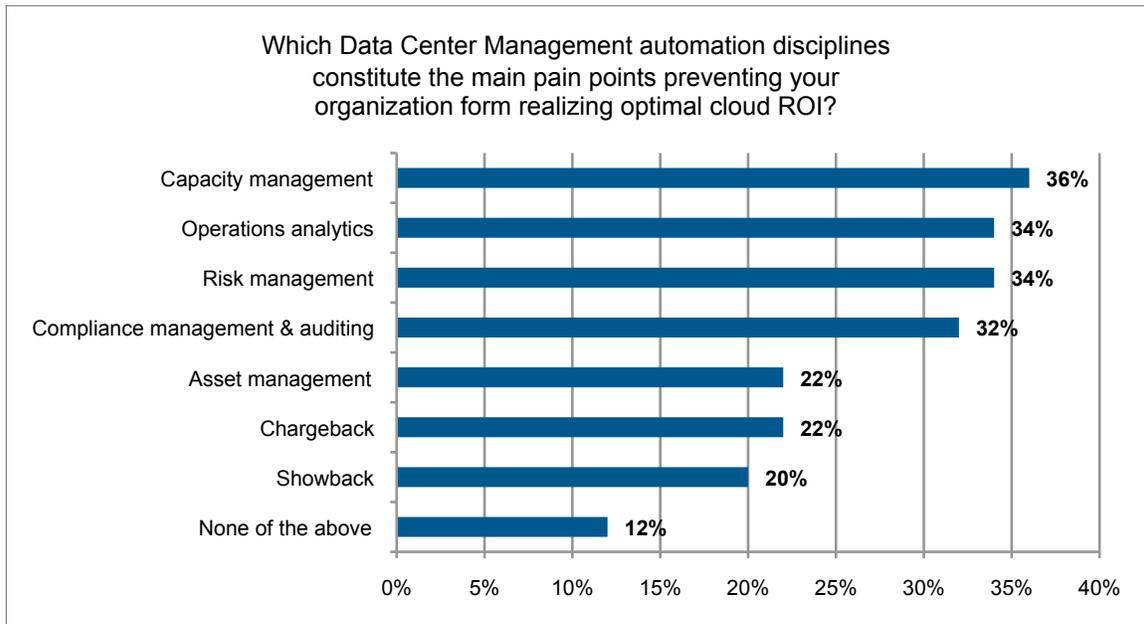
Chart 3 - Capacity Management as the Key Pain Point Preventing Optimal Private Cloud ROI

Broad Platform Coverage: One of the universal truths in systems management says that "nothing ever goes away in the data center, but new things simply get piled on top of existing systems and software." Therefore, it is essential for systems management software to be able to support a wide range of server, networking, storage, security and virtualization platforms. The degree to which management tools play within this type of multi-vendor environment can be used as an indicator of their expected ROI.

How the SolarWinds Portfolio Fits the Bill

SolarWinds offers a wide range of systems and applications management tools, but how do they satisfy today's key requirement of application-centric systems management? The "secret sauce" of the SolarWinds portfolio consists of the integration of application monitoring and the monitoring and management of heterogeneous server, storage and network resources, as well as multiple hypervisor platforms. This integrated approach to systems management breaks down the typical IT silos by offering role-based and task-driven dashboards that can be easily customized and turned into reports. It also enables near real-time capacity management to ensure optimal application placement and avoid waste. "What-if" scenarios and advanced trending capabilities enable system administrators to conduct capacity planning tasks way beyond what would be possible based on the traditional spreadsheet-driven approach.

Visibility from the Application Down

The integration among SolarWinds Server & Application Monitor, Virtualization Manager, Storage Manager and Network Performance Monitor enables full visibility of the application stack consisting of applications, virtual machines, physical hosts, datastores and storage. This integration enables SolarWinds to provide specific recommendations and historic context to determine performance patterns and how they coincide with configuration changes. By knowing what's going on in

By knowing what's going on in terms of processes on a specific virtual machine, troubleshooting efforts can be focused on application symptoms.

terms of processes on a specific virtual machine, troubleshooting efforts can be focused on application symptoms. EMA was specifically impressed with SolarWinds Server & Application Monitor's capability to quickly set up monitors for any server process (e.g. related to Exchange, SharePoint, Lync). These monitors can then be made part of SolarWinds Virtualization Manager's infrastructure monitoring and management dashboards, making virtualization management truly application-aware.

EMA applauds SolarWinds's capabilities to proactively manage environments to prevent application performance degradation or outages in the first place. System administrators can define alerts for disk latency, virtual machines without heartbeat, high memory utilization, etc. that require manual or automated remediation actions. SolarWinds provides the application context of these alerts, facilitating the drill-down into the ill-performing virtual machine to detect, for example, datastore issues such as high I/O latency. From there, system administrators can see what storage hardware is being used and determine whether virtual machines need to be moved, a SAN upgraded or simply unused snapshots removed.

SolarWinds offers an impressive set of views, showing which enterprise applications are responsible for a certain amount of CPU, memory or datastore utilization on a specific virtual machine. Datastore latency can then be correlated with physical network and virtual machine performance, which often provides clear evidence of where the resource contention lies. Datastore performance views show all applications affected by the specific datastore and enable click-through to the performance of each individual application. In addition to performance metrics, the remaining capacity of the application infrastructure is also visible, telling the application owner how tight resources really are.

Users can drill down all the way to host hardware health information – including power supply, fan, temperatures, memory, chassis info and disks. At each level, SolarWinds presents system administrators with related alerts that can offer valuable insights into the root cause of an issue. For example, system administrators can see which other storage performance-hungry virtual machines are running on the same datastore and could cause the issue. This ability of identifying seemingly unrelated side effects of hosting a virtual machine or an entire application environment on a specific set of infrastructure components should be seen as one of SolarWinds' core strengths. To further strengthen these diagnostics capabilities, SolarWinds offers its so-called "time travel" feature, where users "can go back in time" to view how an issue evolved and identify correlations between configuration changes and specific alerts.

Application-Centric Storage Insights

SolarWinds addresses the challenge of enterprise storage being almost entirely unaware of the applications depending on it, by offering dashboards showing which clusters, hosts, application services and virtual machines are affected by a certain datastore and then can provide a link to the underlying storage LUN with SolarWinds Storage Manager. This facilitates the correlation of virtual machine performance with datastore or LUN latency or capacity bottlenecks. EMA was impressed by SolarWinds' capability of showing a historic overview of how virtual machine performance, datastore performance and application alerts coincide, enabling system administrators to quickly identify the root cause of an issue.

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Breadth of Platform Support and Rapid Time to Value

SolarWinds supports a broad array of applications – 150 monitoring templates are included – and storage arrays, as well as the two most popular virtualization platforms (VMware ESX/ESXi and Microsoft Hyper-V). This ability to offer out-of-the-box value within most given customer environments, in combination with the ability to easily create custom application monitoring templates, leads to rapid time to value.

SolarWinds Virtualization Manager is delivered in the form of a virtual appliance and can therefore be rapidly deployed. SolarWinds promises that each one of its other systems management applications can also be deployed in under one hour and operate without requiring agents. This leads to rapid deployment of SolarWinds products within cost-conscious organizations.

EMA Perspective

The integration of systems management and application monitoring tools is where SolarWinds truly shines. However, each individual tool by itself provides tremendous value. Today, server, virtualization, network and storage administrators are expected to know the application impact of their every move. SolarWinds makes this possible.

The excellent user interface can be customized without much training and delivers the necessary context, without overloading the system administrator with irrelevant metrics. EMA was impressed with the task-driven dashboards for VMware or Hyper-V administrators, VM sprawl prevention, chargeback/showback and capacity management that are all offered out of the box. The SolarWinds query capabilities reach across traditional silos and enable holistic views of entire application environments.

SolarWinds is worth a close look for everyone in need of a robust suite of well-integrated and application-centric systems management tools that are powerful and scalable yet come at a comparatively affordable price point.