

Akorri BalancePoint : Next Generation Data Center Visibility

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Whether an infrastructure is physical or virtual, IT Managers have long struggled to identify and investigate application performance across multiple layers of applications, databases, operating systems, servers, and storage. Each of these layers of the IT infrastructure multiplies the dependencies between systems, and obstructs even the best intentions when it comes to strategic planning and right sizing infrastructure, or performing root cause analysis in response to performance issues. The effect is that IT administrators are flying blindfolded – regardless of whether it is figuring out how many virtual hosts should be consolidated on a server, how much more IO can be placed on an array, or where a sudden deterioration in application performance came from.

The good news is, where the big vendor tools stop, there is room for innovation by those fleet of foot. One such innovator is Akorri, and their solution is BalancePoint – a cross domain, visibility and correlation suite purpose built for on-going management of *application-to-spindle* performance.

We've long held that solutions that can understand application interactions across all layers of the infrastructure *and* bring sophisticated correlation engines to the table will pave the way to the future of the next generation data center. Such tools are simply a key component of the management layer required in an increasingly complex, dense, consolidated, virtualized, and ever-changing data center. The data center cannot adapt to ever-changing business demands without insight, and insight cannot come in limited buckets that restrict an administrator's visibility to single domains, or impose a perspective from a single layer of the infrastructure.

In this solution profile, we'll take a look at the challenges surrounding insight in both physical and virtual infrastructures, and then take a look at BalancePoint. Today, BalancePoint, plugged into VMware's vCenter management console, reaches well beyond any virtual or physical data center silo, and paints a picture of end to end infrastructure performance, tracing performance events, capturing changes, and correlating it all for total data center visibility.

Virtual Invisibility

Several years ago, when server virtualization technologies first stormed onto the market, the data center infrastructure was already complex enough.

Servers were becoming increasingly dense and powerful, leading to more connections (both SAN and LAN) across more switches than ever before. Moreover, applications were breaking out of their centralized scale-up architectures, being purpose built for

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specific business processes, and becoming lighter weight and more widely dispersed than ever before. The data center was simply exploding with new components, applications, and databases.

Today, with the arrival of VMware's enterprise-class hypervisor, the data center is undergoing the most dramatic shift in resources it has seen in decades, further exacerbating complexity. The same applications that were formerly becoming widely dispersed across servers are now being rapidly reigned in and consolidated on isolated virtual machines running on single physical servers. Unfortunately, with this consolidation, comes more layers in the enterprise, and new "virtual" versions of nearly every infrastructure device.

The end result today, is that the infrastructure is complex, and this complexity clouds our visibility into it. This is largely because the industry turns to unique tools for each layer of the infrastructure, and these tools are often designed for configuration rather than visibility into *dependencies between the layers*. Let's take a look at a specific example.

Managing a Tangled Web

Recently, we talked with an administration team managing a complex virtual infrastructure behind a business application for external partners. For physical infrastructure, this environment used NPIV supported RDM-based storage volumes on a mid-range array, attached to servers via a collection of 2Gbps and 4Gbps HBAs,

various switches/directors. This virtual infrastructure ran several web application servers, a messaging server, a message queue server, and a database for a single web application environment. Each layer of this solution adds more complexity, including virtual switches, virtual NPIV WWPNs, and virtual file systems mapped through host physical file systems, built on top of various different types of array disk sets, LUNs, and MetaLUNs.

This example virtual environment is small but complex. The business that owns this environment runs into periodic performance issues that usually turn out to be connectivity constraints, storage LUN constraints, or application bottlenecks on the hosts. But isolating a problem and determining its cause is anything but simple. This specific customer uses a complex assortment of tools including:

- A storage management application that provides overview of LUN configurations and periodic samples of load against specific disk groups, but falls short of profiling load associated with specific hosts.
- Command-line access to real time per-port IO loads at the array level.
- A SAN management application that can display basic IO characteristics on a per-port basis.
- A complicated network management suite that requires considerable drill down to get to performance statistics.
- An SNMP alerting suite configured to routinely poll limited statistics and perform ping response tests.

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- Performance monitoring by a server management team using Microsoft's Performance Monitor application.
- Performance monitoring of the entire virtual server environment with VMware's vCenter.
- Performance monitoring within IIS by a web application team.
- Performance monitoring at the server and database level by a DBA team.
- A broad array of different release management and configuration/change management systems ranging from Excel spreadsheets to Access databases that are accessed to review changes and their potential connection to performance issues.

Because of the wide number of tools in use, performing any activity – including right sizing new equipment, or figuring out the cause of a performance issue – can turn into multiple-day, manpower intensive nightmares. An exercise as simple as trying to identify available capacity on a virtual server can have the team mapping where virtual guests are mounted, extracting data from IO performance tools at the array, extracting CPU utilization reports, attempting to correlate this data at specific points in time, and then “guestimating” what total available performance at those points in time may really be. And this exercise barely touches on the challenges associated with performance issues, which may map to application changes, database misconfigurations, or any number of other root causes.

The Element Management Challenge

The reason our example environment faces such arduous undertakings for routine planning or troubleshooting is pure and simple lack of cross-domain visibility. Typical solutions in the marketplace approach infrastructure visibility with an “element management” paradigm. Element managers focus on each element of the infrastructure – servers, HBAs, switches, and more – but provide little insight into the relationships and dependencies between elements. Element management is required for the data center – indeed, no other approach is appropriate for diving into the configurations of data center components – but element managers will never give administrators the right toolset to hunt down and identify performance issues caused by systems outside their domain of management. As an example, runaway server utilization or overloaded storage LUNs might be caused by application events well outside the domain of management of a server or storage tool.

In the list of tools used in our example environment, the limitations of element management are clear. Each of the tools in this customer environment is an element manager. Each element manager focuses on data collection and/or configuration management with a perspective limited to a single domain of the infrastructure. There is no single pane of glass with which to view causal relationships between misconfigurations, workloads, or other issues across domains. The potential implications of troubleshooting a performance issue at the application level,

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which may require the review and elimination of issues in nine other tools, is enormous. Not only are multiple tools involved, but it is left to the administrative staff to understand “normal” operating states within each toolset, and then identify whether out-of-bound conditions are relevant to an issue or not. One particular element in the infrastructure running at a level above normal may not be the causative factor of a performance issue. The time and effort associated with a fractured approach to infrastructure visibility could be drastically reduced with a better solution.

Why Element Management Falls Short

Major vendors, including VMware itself, have tried to rise to the challenge of providing more visibility into the infrastructure. In reality, VMware has been forced to rise to this challenge because the virtual infrastructure becomes even more opaque than a physical one, and can rapidly lead to many more servers, virtual appliances, real or virtual network devices, and dependencies within the data center. The example given speaks to this – not only is the management team overrun with tools, but a number of those tools encounter an unbreachable wall when it comes to using traditional methods to look into the virtual switches, volumes, and connections that make up the innards of a virtual server.

But a better solution does not just entail improved visibility with fewer tools – it also requires an ability to “relate” performance data from one system to the performance data of another. A toolset that focuses

strictly on the elements within an environment does not show an administrator what is happening with one system in the context of other workloads on other systems or the load on other components within the data center.

In our view, the enterprise simply requires a system that provides cross domain visibility in a single pane of glass and shows every system in the context of what is happening with other systems.

Cross-domain Infrastructure Analysis and Management

Over the past few years, we have seen an increasing number of vendors bringing solutions to market with analysis engines that correlate data about configurations and performance behavior across numerous products in various different infrastructure domains. While these tools in the past have been limited by their applicability to specific domains, such as data protection, innovative vendors in this space have recognized that correlating data and events across infrastructure domains can provide a foundation for breaking free of the management shortcomings created by domain-specific element management tools.

One such toolset is BalancePoint by Akorri. BalancePoint reaches across infrastructure domains while identifying and mapping dependencies between systems, including every application, server, and set of storage resources. BalancePoint does this with either a BalancePoint management console,

or a vCenter plug-in that reaches across the virtual and physical environments.

Focus on BalancePoint

Akorri realized early on that there were two core capabilities that were critical to infrastructure management and unmet in today's products: 1) understanding cross-domain dependencies, and 2) creating real time visibility from an understanding of cross-domain dependencies. To map the complex dependencies within sprawling infrastructures, Akorri turned to standard and proprietary interfaces - including SSH, WMI, vCenter APIs, SNMP, CLIs, ODBC, and SMI-S – for the *agent-less* harvesting of data that enable sophisticated dependency mapping. BalancePoint's long list of protocol support means it is more than just an infrastructure mapping tool, but maps dependencies clear through to the application layer. For example, using ODBC, BalancePoint can even drill into SQL and Oracle database table maps, indexes, and other parameters to reveal where database elements are stored, and whether they are configured well. BalancePoint's dependency mapping isn't perspective-specific – by that we mean that BalancePoint understands every relationship in every direction, whether that means which storage LUNs an application depends upon (downward visibility), which applications a LUN supports (upward visibility), or every LUN which a disk group supports (horizontal visibility). Moreover, BalancePoint's visibility is dynamic, allowing users to graphically drill into other layers of the infrastructure to change their perspective and see new details and

Partial Answers to the Visibility Challenge

While future visibility improvements in the virtual infrastructure are imminent, we suspect full sets of tools for deep visibility will be some time in coming to market from the virtualization vendors themselves.

Take for example VMware's recent announcement of vCenter. At first glance, an emerging technology on the fairly distant vCenter roadmap looks prepared to solve part of this problem. But from initial announcements, this component named AppSpeed looks to be restricted to response time based load measurement of web servers and policy-based workload redistribution. The limitations of this approach are numerous: web server load does not reflect all of the dependencies that may be at play in a performance issue; response time based metrics shed little light on total environment performance; other applications exist besides web applications; and AppSpeed appears to offer little or not insight into dependencies upon other infrastructure domains. Moreover, even if AppSpeed someday does reach into other layers of the virtual infrastructure, we suspect VMware will not soon reach outside of the virtual infrastructure. As long as physical devices exist in the enterprise, the enterprise needs deep understanding of every relationship between every component in the infrastructure, from every component of a complex application right down to physical devices. In our view, anything short of this ideal is subterfuge for management and troubleshooting.

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dependencies. After an initial discovery session, BalancePoint provides an end-to-end logical performance map of a customer's infrastructure from any perspective.

With a deep-reaching dependency map in hand, Akorri turned to the second shortcoming of infrastructure management solutions – real-time visibility. Using their agentless architecture, Akorri added a layer of periodic utilization and response time polling to BalancePoint's cross-domain mapping engine. The result is a powerful cross-domain performance correlation engine. Using this tool, administrators can see historical performance, easily recognize where performance is out of bounds, and then drill through the past performance metrics of each component to see where a bottleneck or misconfiguration might reside. Then, with the problem component identified, administrators can easily determine if another system is overloading that component, or if the component changed at a specific point in time related to a patch or upgrade.

But BalancePoint's capabilities reach much further than troubleshooting. Out of cross-domain dependency mapping and utilization monitoring Akorri has constructed a platform for proactive infrastructure management. By collecting and correlating utilization at different points in time and running a sophisticated analysis with proprietary algorithms, BalancePoint can identify the optimal utilization point for various components of an infrastructure – including virtual servers and storage.

Most infrastructures today are limited by the fear of performance optimization trade-offs. When performance is run too high on systems – whether servers, storage, or other components – latency often increases well before total performance saturation is reached. In a virtual environment, these issues are further exacerbated – there is rarely good visibility into how many more guests or applications can be configured on a virtual host, nor whether that host will run into a storage bottleneck. Consequently, managers stay away from high performance loads to avoid the impact of latency on applications. BalancePoint offers a solution to this problem.

Akorri has engineered BalancePoint's ability to correlate performance load and system responsiveness into a comprehensive toolset for environment modeling and capacity management. Since BalancePoint maintains a running history of performance in an environment, it understands how performance peaks impact system latency. Akorri has leveraged this along with their own algorithms and analysis, to create what Akorri calls "Performance Dynamics Modeling." BalancePoint examines application workload, utilization and response time of the infrastructure to determine if the infrastructure is under or over-utilized – not at a single point in time, but over time, accounting for all peaks and troughs in application workloads. BalancePoint then predicts how much additional application workload can be added before reaching the optimal operating point (maximum utilization with minimal latency). To do this, Akorri provides the administrator with

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an “Akorri Performance Index” that with a single metric identifies how completely resources are being used before incurring latency. Moreover, using this performance index and BalancePoint’s historical database, BalancePoint can predict how resources might be impacted by end of month or seasonal peaks in activity. Finally, Akorri has wrapped a layer of wizardry around this analysis so that tools like their “Provisioning Analysis” can be used to model planned new workloads and help the administrator select the best storage and server configurations. The result is a predictive, proactive tool for right-sizing your infrastructure, and making sure you are getting maximum utilization from all of your resources, without guesswork, or painful trial and error.

BalancePoint in the Data Center

By coupling together deep infrastructure understanding with real-time visibility in a way that facilitates both reactive and proactive management, BalancePoint can drastically alter the approach of most organizations when it comes to infrastructure management. We see three significant strategic impacts that come from these alterations.

- **BalancePoint improves reactive, tactical visibility**

In terms of TCO, we suspect users will most easily and immediately recognize benefits from BalancePoint’s reduction of troubleshooting time and effort. With visibility into dependencies and historical as well as real-time performance, BalancePoint can give administrators mouse-click access to

total infrastructure root cause analysis in a matter of minutes, versus days.

- **BalancePoint improves proactive, tactical administration**

Secondary to the time and effort associated with troubleshooting, the savings around avoiding unplanned impacts from service events should not be overlooked. While we have not conducted a formal study, in our estimation, it is likely that billions of dollars are lost annually by businesses experiencing outages or service impacts because of unrecognized dependencies that broadened the scope of a routine service event. BalancePoint will help administrators better understand their environment and avoid unintended impacts.

- **BalancePoint can be a platform for IT Service Governance**

For the first time in IT infrastructure management history, Akorri BalancePoint delivers a meaningful measure of infrastructure performance that can be equated to infrastructure service delivery. But BalancePoint goes further than analyzing overall performance, reporting on it, and noting exceptions – BalancePoint presents a picture of how capital resources (infrastructure) will deliver IT services. As a result, IT can strategically plan an infrastructure for desired performance levels. In turn, this picture can be used to cost-optimize an infrastructure, and put an end to wasted capacity that is burning operational dollars - in the form of administrative upkeep, power and cooling costs - as well as capital dollars as the infrastructure is replicated and needlessly replaced.

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Taneja Group Opinion

As we've noted here, Akorri's BalancePoint is pioneering a new form of IT infrastructure management. Akorri's unique approach finally offers IT managers meaningful insight into their infrastructures: a related picture of events occurring across all systems, which can be used as a tactical tool for day-to-day troubleshooting; as well as a proactive strategic tool for optimizing the management and cost of IT infrastructure,

with an eye towards delivering exceptional IT infrastructure service. We have no doubt that challengers will someday be on the horizon, but today, Akorri is leaps and bounds ahead of traditional infrastructure management vendors. IT infrastructures today are fraught with complexity, and BalancePoint is one way, if not the only way, out. In our opinion, BalancePoint carries potential tactical and strategic benefits that simply demand evaluation.

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