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INCREASING VISIBILITY INTO VIRTUALIZED SERVER ENVIRONMENTS

Storage Switzerland, LLC

George Crump, Senior Analyst

Server virtualization is a powerful new weapon in the battle to drive cost out of the data center while at the same time increasing IT responsiveness to the organization. The ability to share all available resources across multiple workloads and to move those workloads across the environment has broken down the silos within IT departments of server, application, network and storage. While responsiveness to immediate needs has improved, diagnosing problems has become more complex. Solving these problems requires increasing visibility into virtualized environments.

Troubleshooting the virtualized environment requires a different level of visibility that organizations did not need pre-virtualization. In the past when a problem arose within an application stack each department merely had to prove that it was not their fault. Now because of the highly dynamic nature of virtualized environments and the lack of operational silos, the problem has to be viewed in a more holistic end-to-end manner.

Server virtualization also removes the margin for error that most data centers count on when trying to diagnose problems that arise in the environment. As utilization increases and physical resources are consolidated, it is increasingly unlikely that the data center will have the spare headroom to handle unplanned spikes in demand or to absorb problems that have arisen. This pressures the data center to identify and actually fix these problems. Not having visibility into the virtualized environment can mean not being able to respond to the businesses needs for storage capacity, network bandwidth, I/O connectivity, etc. The loss of headroom also put greater pressure on predictive analysis, being able to identify problems before they occur.

In a ‘shared everything’ environment a peak load is no longer isolated to a single system. That peak load is now likely distributed across dozens of servers, applications, network and storage, impacting potentially both I/O rates and capacity of each. While server virtualization does improve the ability to shift resources to compensate for a peak load or unexpected problem, the lack of visibility across functions makes it hard to troubleshoot what is being impacted. While the ability to work around the unplanned spike in resource contention can be solved by virtualization via migrating workloads, most data centers lack the tools to best leverage the capabilities of server virtualization and address the sudden resource demand. In other words you need to know what workload is causing the problem, what specific resource that workload needs or is consuming and then know where to shift that workload or other workloads to alleviate the problem.

The dynamic nature of server virtualization also makes it more difficult to predict when and where an increase in resource demand is likely to come. Prior to virtualization, again because systems were dedicated, the individual workloads could be identified, monitored and trended on a per-server basis much easier. If the resource consumption of an application running on a dedicated, physical server was growing, that could be easily observed, trended and forecasted. Additional resources, like more memory, faster network connections or additional storage capacity could be added to the server as needed. More importantly, each of these potential resource needs could be individually analyzed to correctly identify which ones the server and application needed instead of guessing or worse installing everything.

In the highly dynamic virtualized server environment, planning and trending without the aid of software tools is much more challenging than in the dedicated, physical server world that we're leaving behind. Again, in traditional dedicated server environments the needs of the single server and applications were all that had to be analyzed. A 50% spike in resource needs, as an example, was somewhat obvious to identify and correct. In a virtualized environment a physical host with ten VMs could become resource constrained even if each of those VMs only experienced a 10% increase in demand. Not only is a resource spike harder to troubleshoot, it may be a legitimate need or it could be a problem with available resources, the probability of a resource conflict occurring is greater.

For example, if each VM needed 10% more network I/O, gradually over the course of a week, by the end of the week that host may not be able to support the increased network bandwidth either due to local (e.g., NIC cards) or upstream (e.g., physical switches) network bottlenecks. And, performance would suffer even though on an individual VM basis there was only a minor gain in consumption. Worse, if a single VM suddenly spiked its network resource needs, pinpointing which of these ten VMs was the culprit is time consuming, without the aid of tools to alert the administrator to these situations. Even the tools provided by the server virtualization vendors are limited in their ability to identify if the issue is in the compute, storage or network layers (or a combination of any of the three) of the infrastructure. The result is often a "throw more hardware at it" approach to troubleshooting, when the simplest solution may have been to identify the single VM that was a problem and move it to a host that has the appropriate excess capacity.

Another key visibility need is caused by the very nature of server virtualization: virtual machine sprawl. In the pre-virtualized environment adding a new server was a scheduled event and change control processes were well defined. The server had to be bought, which also meant it had to be cost justified and planned for. There was a physical box that came into the data center and was mounted. Affected parties, like backup or network administrators, were either directly involved in bringing the server online or at least would notice the new unit as they walked through the data center. Most importantly it took time (weeks-to-months). Logistically speaking, only so many servers could be added on a monthly basis, limiting the agility and flexibility of the business.

The virtualized environment turns all of this on its head and allows organizations to deploy new applications in minutes rather than weeks. With a literal click of a button a new server can be deployed and be in production in minutes, often at no hard cost to the organization. The problem is that even though these are virtual servers they consume physical resources like memory, network and storage capacity. They also need to be protected. The virtual nature of VMs also makes it more difficult to prove the need for more physical resources as those VMs sprawl. Since the addition of a virtual server may not always be a funded project, getting budget allocated to replace the consumed resources becomes more challenging. Proving the need when there is not a physical box to represent that need can be organizationally challenging.

The final visibility need caused by server virtualization is caused by the way most organizations are structured. There is often a network administrator, a database administrator, a storage manager and a server administrator, each with their own responsibilities and specializations focused in each area. But there is seldom a specialist for the virtualized environment. These organizational 'silos' need to be broken down to effectively manage the environment since virtualization crosses all of these boundaries.

The old tools, often simply a spreadsheet, used to measure and monitor the resource consumption of an environment do not scale and are already outdated even in the non-virtualized data center. And their uselessness becomes more pronounced in the dynamic, 'non-siloed' world of server virtualization. What's needed are solutions like those available from SolarWinds that can provide information from the host infrastructure to each individual guest in that infrastructure to the VMs on those hosts. The software can monitor the complete IT stack from the application layer-to-compute-to-storage-to-the-network, both from an individual view as well as a collective view.

The critical capability is to be able to provide an end to end view of the virtual infrastructure. One that goes wide across the hosts within the virtual cluster and also goes top to bottom to capture network, storage, I/O and capacity concerns. Each of these components warrant their own detailed investigation, something that Storage Switzerland will do in upcoming articles.

These solutions can also provide predictive analysis and trending on how resources are being consumed so that additional resources can be budgeted for. Comparisons can be generated to provide a real-time, up to the minute 'before and after picture' showing the impact of the recent addition of VMs. Most importantly these tools can help data centers virtualize more of their environments. Often most data centers have virtualized the non-mission critical applications and possibly a few of the business critical systems. But there's a fear of the unknown impact of virtualizing more demanding servers. Offerings like SolarWinds' Orion NPM, Orion APM and Virtual and Server Profiler can provide analysis of existing physical servers and then map those servers to the virtual environment so that the resource consumption levels after migration can be understood. There is even the capability to assess the impact of that load on the chosen virtual host so that the overall impact of a migration of the application can be understood before it's undertaken.

Increasing the visibility into the virtualized infrastructure requires that tools be put in place to provide a combined view of the infrastructure so that all the resources and virtual servers can be seen clearly. This allows a single administrator to see the entire environment and understand the impact of shifting servers and growing resource consumption. It most importantly gives them the ability and confidence to further utilize existing resources and to encompass more servers in the virtualization project, both of which leads to greater efficiency and lower costs.