



## Virtual Instruments helps large U.S. Federal Agency maintain application availability and smoothes the path to increased use of virtualization technologies

### Agency Overview

This agency is one of the largest and most complex. Over 40,000 officers and agents use the latest information technologies and procedures to assure agency can complete its ongoing mission.

### IT Environment and Role

The agency's data center houses over 3 petabytes of data in the main datacenter, with additional storage in the secondary and disaster recovery sites. Thousands of physical and virtual AIX, Linux, Windows, and mainframe servers support storage systems from HDS, EMC, and NetApp, with over 6,000 Fibre Channel SAN ports provided by Brocade.

Even a small slowdown in the primary applications performance could result in unacceptable backups and delays for the over 300 sites accessing those applications, costing literally hundreds of millions of dollars, or delaying the processing and workflow of tens of thousands of agency constituents per hour.

### Challenges and Solutions

- **Server/Network/Storage problem diagnosis.** When a performance problem arises, the agency can start investigating at either the server or storage tier, but it's often not clear which approach is optimal. The server might have a busy LUN or might have a queuing problem, or there might be congestion between ISLs in their

#### Challenges:

- Finding configuration problems that impact performance and availability
- Server / network / storage/ application performance problem diagnosis
- Accelerating deployment of virtualization

#### Solution:

- Virtual Instruments VirtualWisdom software, SANInsight monitoring hardware, and professional services consulting

#### Agency Benefits:

- Decreasing time to resolution is accomplished by monitoring the SAN with Virtual Instruments software and hardware probes.
- Supports all Fibre Channel devices: Because VirtualWisdom monitors the SAN at the physical layer, it has no use or need of vendor APIs, the robustness and quality of support is identical in all the various vendor implementations
- VirtualWisdom offers proactive problem detection and helps maintain application response times by measuring the net effect of the entire dynamic SAN infrastructure on application latency.
- By analyzing fault trends, agency can begin to see patterns of failure, and therefore catch the borderline cases before a major meltdown occurs.
- With VirtualWisdom's "what if" capability, planned changes



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edge/core/edge topology. They needed a rapid drill-down solution to help point to the first places to look for problem root cause.

- **Accelerating deployment of virtualization.** The agency Information Technology team is expected to bring new applications online faster with more certain accountability through a service-based computing model. In addition to server virtualization, storage virtualization will enable a tiering model based on service levels.

## VirtualWisdom Value

### Troubleshooting the SAN

Decreasing time to resolution is accomplished by monitoring the SAN with the complete set of VirtualWisdom probes. The ability to prove whether or not the SAN is to blame for slow application performance within minutes focuses the right team on the task and allows other teams to remain focused on other tasks. Running historical reports to look back in time enables faster time to problem identification and resolution. In some occasions, a troubleshooting probe may be configured to "capture" the moment of failure, reducing the overall time to discover the root cause. VirtualWisdom is the only product that can monitor and send an alert about storage access times, congestion, link errors, and SCSI errors, and generate trend reports that show the behavior of a heterogeneous SAN, over time. This information helps to expedite troubleshooting and allows the agency to prove whether the problem is in the SAN or elsewhere, such as the application or server. This simple first step often speeds troubleshooting by days or even weeks.

### Heterogeneous Support

Most SRM tools are optimized for the systems supplied by the storage vendor who builds that SRM product. Because VirtualWisdom monitors the SAN at the physical layer, it has no use or need of vendor APIs. With VirtualWisdom, the robustness and quality of support is identical in all the various vendor implementations. The agency uses systems from many vendors and appreciates the value of a monitoring and analysis tool that offers the same view of performance no matter who supplies the infrastructure. Learning curves are shortened, staff training is optimized, and the agency is free to select the storage system or virtualizer that best supports a particular initiative.

### Application Performance

Ultimately, the agency's storage staff is judged by how effectively it supports the application consumers. VirtualWisdom offers proactive problem detection and helps maintain application response times by measuring the net effect of the entire SAN infrastructure on application latency. With VirtualWisdom, it's pretty easy to

to the infrastructure can be modeled, and the effect on application response time can be forecasted to the millisecond, using actual production I/O data. So many change or configuration-related problems can be avoided.

*"We just can't have a system down or even slow. Our success is measured by 24x7 real time access to our applications."*

*That being said, it's important to be able to charge our customers for services they are actually using. To do that we have to build a service oriented architecture with modern monitoring and analysis tools."*

Gregory Phillips  
Chief Architect, Phillips  
Technology Solutions, serving as  
Principal Systems Architect for  
one of the agency's Data Center  
Operations Groups



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demonstrate that everything in the SAN is balanced.

## Optimizing Use of Storage

The agency expects VirtualWisdom to help determine when and how much future SAN capacity to acquire. VirtualWisdom helps ensure that IT is using the right class (tier) of storage by enabling the agency to utilize lower cost storage while maintaining performance SLAs. A good process is to look at each application, measure latency, IOPs, cache hits and review the historical data to determine which applications to move to lower tiers. The key to re-teiring is the use of storage virtualization. What used to take many months, can now take less than a week.

## Predictive Analysis

Hardware failures can be classified into two categories: unpredictable/sudden faults & predictable/borderline failures. By analyzing fault trends, the agency can begin to see patterns of failure, and therefore catch the borderline cases before a major meltdown occurs. With VirtualWisdom, SAN Administrators can monitor fault trend reports to capture escalating errors before a total failure occurs. Replacing a failing component is a way to handle trend-able hardware failures to help prevent outages.

And with VirtualWisdom's "what if" capability, planned changes to the infrastructure can be modeled, and the effect on application response time can be forecasted to the millisecond, using actual production I/O data. So many change or configuration-related problems can be avoided.

## Lessons Learned

According to Greg Phillips, Chief Architect Phillips Technology Solutions - <http://www.phillipstechnologysolutions.com/>, serving as Principal Systems Architect for one of the agency's Data Center Operations Groups, "When in doubt; put the TAPs in. And when you're doing infrastructure upgrades; replace patch panels." This allows complete non-disruptive monitoring immediately or at a later date. Second, Mr. Phillips advises to pay close attention to I/O considerations during planning for consolidation. Consolidating virtual servers onto existing physical servers can create bottlenecks in the SAN as more data is pumped through existing SAN links. It's important to utilize N\_Port ID Virtualization (NPIV) to help measure the I/O from the VM to the LUN in real time to avoid unexpected slowdowns.



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