

U.S. GOVERNMENT CASE STUDY



Virtual Instruments helps U.S. Federal Civilian Agency Avoid Over-Provisioning; saves \$1M of CAPEX in year one

Agency Overview

This U.S. Government agency's mission is to help strengthen the national economy.

IT Environment and Role

The agency's data center houses over 1 petabyte of tier I storage and a mix of top end Unix servers and Microsoft Windows servers. VMware server and desktop virtualization are used extensively on the Windows environments. As an added complexity, since they are out of office space for the many users they have, there is a large percentage of work-from-home personnel, and they are paid by the documents they review and approve. The primary applications are very large and exhaustive searches, some of which can take over 24 hours on even the largest servers! To ensure productivity of this large base of local and remote users, they have a System Performance Team that is responsible for monitoring the performance of the servers, networks and storage. The manager has an extensive background in performance management across platforms from mainframes to PCs, and leads a team of specialists. He works with a peer team focused solely on storage.

Challenges and Solutions

- **SAN/Server/Application problem diagnosis.** The agency is dealing with more layers of abstraction every year, including the expanded use of virtualization. When a performance problem arises, they can start investigating at either the server or storage tier, but it's often not clear which approach is optimal. The server might

Challenges:

- SAN / application performance problem diagnosis
- Quickly finding configuration problems that impact performance and availability
- Identifying and avoiding over-provisioning

Solution:

- Began deploying Virtual Instruments VirtualWisdom hardware, software, and professional services consulting in 2007

Agency Benefits:

- Increased productivity of staff by eliminating guessing and speeding root cause analysis
- Provided a Key Performance Indicator (KPI) in the form of the Exchange Completion Time (ECT) metric
- Avoided unnecessary capital expenditures by proving that performance problems could be solved by proper configuration and application tuning, rather than throwing expensive hardware at the problem
- Avoided potential outages and performance problems through greater insight into the effect of SAN changes

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have a busy disk or might have a queuing problem, for example – they need a “rapid drill-down tool.” Recently, they upgraded a production server (doubling CPU capacity) and implemented data replication to a backup site. The new production server was more powerful than the original, but I/O performance dropped by 25%, and the team was baffled. They first explored the problem from the server vantage point and found a mismatch between logical and physical I/O operations. Using Virtual Instruments VirtualWisdom with the ProbeFC8, the team traced I/O traffic on the Fibre Channel network between the server and logical volume manager (HP/Veritas) and discovered an I/O packet size mismatch (8k vs. 16k). With hard evidence, they were able to prove to the LVM vendor that it was a configuration error on their part: they had not tested for 16k I/O packets.

- **Identifying configuration errors that impact SAN performance.** In another situation, a virtual server farm (cluster) was regularly failing and refusing to boot. Server and hypervisor diagnostics couldn’t identify the problem, and failure meant moving 13 hosted virtual desktops to another server. By tracing the FC network, the agency determined that the target device was issuing an abort sequence upon touching the LUN, and the virtual machine OS was improperly handling the valid FC alert – it wouldn’t boot until the LUN was masked. This data from the VI tools helped trace this to an improperly configured driver on the server.
- **Better insight into performance.** This performance team wanted better I/O performance metrics than they were able to collect from their existing SRM tools, including EMC Control Center (ECC). In order to improve service response and track SLAs closely, they needed finer-grained data collection and as little smoothing (time averaging) as possible. ECC’s coarse-grained monitoring often masked spikes, and from a network perspective, the agency wished to be “agnostic”. They use VirtualWisdom to collect data directly at the protocol level rather than viewing a filtered data set via a storage vendor-supplied management product.
- **Key Performance Indicator (KPI).** A quantitative metric was needed to provide a KPI, to definitively measure the effect of the SAN on application response time. VirtualWisdom’s Exchange Completion Time measures, in real time, the SAN-caused application response time latency, to the millisecond. Additionally, this KPI can be kept indefinitely, for accurate auditing purposes. This and other key metrics from VirtualWisdom were used to pinpoint a key application that became the bottleneck and must be modified to address this.
- **Rebalancing SAN links.** The agency also faced some “overburdened” switch links and needed to first identify them, and then determine what the overall impact of running “hot” was on their service delivery capacity. To combat this, the storage team had wanted to upgrade all their SAN ports to the latest, fastest FC technology. The performance team was able to show that the majority of the SAN ports were not running near the capacity of the current FC technology so this would not have solved the problem. Instead they were able to identify and fix the problem on the limited links involved and avoided a costly and unnecessary upgrade.

“VirtualWisdom gives me deeper insight, more data granularity, and near real-time data collection – this is more than I can get from any vendor SRM tool.”

Manager, Systems
Performance Management

“Virtual Instruments’ staff knows Fibre Channel better than most vendors that sell it.”

Manager, Systems
Performance Management

VirtualWisdom Experience

The I/O performance problem was a flagship use case for this agency with respect to VirtualWisdom. It took over 3 months of negotiation for the storage vendor to

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acknowledge the configuration problem. Frustrated during this time, the agency nearly resorted to adding additional LUNs to boost server performance, **which would have cost nearly \$1 million**. Facing such a high cost, the agency was determined to provide an independent, auditable view of I/O subsystem behavior to prove their case to the vendor. VirtualWisdom provided the data and that neutral view. When the virtual server cluster boot failure problem surfaced, the agency immediately turned to the VirtualWisdom Probes and Protocol Analyzers and resolved this problem in much less time. They were able to send traces to their storage and virtualization vendors and encourage the vendors to work together immediately. VirtualWisdom significantly reduced the time required to explain the issue, and provided solid evidence that sped the remediation process. The agency acknowledges VirtualWisdom's real-time and fine-grained data collection, and claims that VirtualWisdom allows them to see what's actually going on at the protocol level, while other tools typically sample or average everything out, smoothing the data too much to be useful. VirtualWisdom also helps the team with fan-in ratio planning.



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