UTHealth

virtana

Benefits

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- Achieved definitive insight and identified major on-going performance issues during normal operations

- Reduced risks of major infrastructure changes through real-time insight into performance implications of change

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- Optimized storage network through end-to-end insight into performance and utilization

" With WorkloadWisdom, we can help guide other groups and teams on what to for regarding problem resolution"

Jon David Phillips
Enterprise Storage and SAN Team Manager

WorkloadWisdom enables leading healthcare provider to select optimal flash storage array that matches application I/O profiles

UTHealth
The University of Texas
Health Science Center at Houston

Company Overview
The University of Texas Health Science Center at Houston (UTHealth), primarily a graduate education university, educates the largest number of health care professionals in Texas. Created in 1972 by the UT System Board of Regents, UTHealth is part of the Texas Medical Center. UTHealth includes the schools of dentistry, biomedical informatics, medicine, nursing and public health, and the graduate school of biomedical sciences. UTHealth is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award certificate, bachelor's, master's, doctoral and professional degrees. Three UTHealth faculty practices treat patients in a variety of Houston-area clinics: UT Physicians, UT Dentists and UT Health Services.

The school offers graduate education leading to proficiency in the skills needed for public health careers. The main campus in Houston offers four degree programs. The regional campuses provide masters and doctoral level education to individuals in areas geographically distanced from Houston. This allows faculty and students to target public health issues of relevance to the communities in which they are located.

IT Environment and Role
Group: UTHealth IT, Houston, TX
Kevin Granhold, Executive Director and CTO IT Infrastructure
Jon Phillips, Enterprise Storage and SAN Team Manager

User-base: Faculty, students and staff around 12,000 plus another 5,000 associated with them.

UTHealth has deployed a metro cluster data center schema to provide primary access as well as active- active DR failover and depends on each data center to run efficiently and be aligned performance-wise in the event of a data center failover occurrence. Each data center is comprised of a consolidated and dense unified converged infrastructure and uses FCoE as its primary storage traffic protocol from the host to the Cisco 5000 series unified switch. It then fans out to native fibre channel through a Cisco MDS 9700 series FC switch to either HDS, EMC or NetApp SAN and NAS storage solutions depending on the application use case.

Infrastructure Schema
Data Centers - MetroCluster with 2 data centers Unified switches: Cisco Nexus and Cisco FC directors

Storage
- HDS G1500
- EMC XtremIO
- VPLEX: EMC VPLEX metro implements a distributed "virtualization" layer within and across geographically disparate Fibre Channel storage area networks and data centers for active-active clustering.
- NetApp: file storage using MetroCluster between data centers

Virtualization
- HP and Dell x86-based servers
- IBM Power Systems series servers

Servers
- VMware clusters
    - 1500 VMs representing 75% of the server base virtualized using VMware
- Citrix ADC for application delivery

Business and Mission-critical Apps
- Allscripts EMR - core clinical and financial solutions
- PeopleSoft - Student and faculty personnel management applications including Human Capital management and Financial management applications
- Oracle Linux is primary database used by the applications
    - RAC clusters can operate active/active and process requests in either data center.
    - SQL and Oracle RAC clusters are stretched between data centers via VPlex disks.
- SQL Clusters can fail over seamlessly

The Allscripts EMR storage infrastructure has native Fibre Channel throughout the data path and UTHealth has complete visibility with VirtualWisdom for this application.
- Research applications require bare metal and are not virtualized
- Exchange and SQL servers have their own native server and storage arrays as well
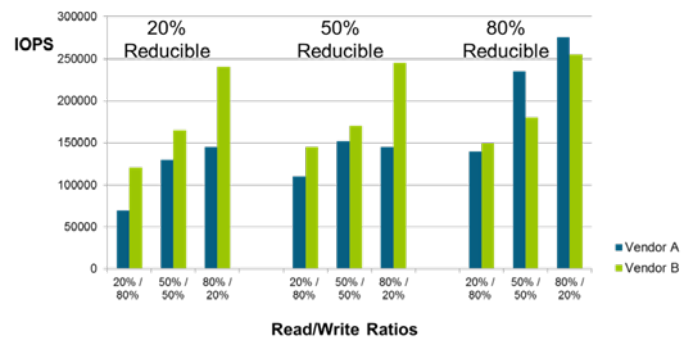

Figure 1: Flash array comparison, showing IOPS

IT Challenge
The principal challenge in the environment was infrastructure visibility or lack thereof. Every status element in the extremely dense converged IT environment was manually collected. Collecting disparate spreadsheets and logs from hosts and then manually correlating with storage systems proved a lengthy and staff-intensive operation. This process would take days and weeks to put together, eliminating any possibility of real time visibility into their systems.

Organizational Challenge
UTHealth achieves business advantage through uninterrupted business applications and medical health records efficiency. The core strategy is to provide a highly available data center environment to all business and health care applications to ensure company, customer and medical access to key information systems during normal and even critical environmental occurrences. The converged FCoE to native fibre channel
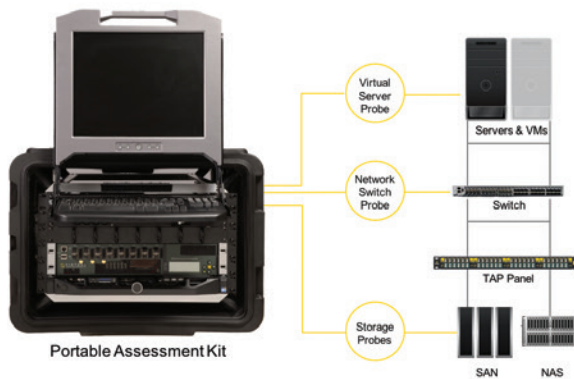
Challenges impacting performance:

Complex, increasingly hybrid application infrastructure

Virtualized environments lack visibility into storage performance

Difficult to predict availability and performance issues

Understanding the risks of migrations, upgrades and new deployment

Predicting how the application will perform in the cloud

Figure 1: An IPA provides all the instrumentation and visibility for an initial health check

data paths must work seamlessly and efficiently across data centers under heavy virtualized stress and with thousands of multi- tenant users. As the organization grows, it aims to both optimize and consolidate data center resources and apply automated IT performance and health monitoring to address the dynamic and challenging medical personnel and student-body application use cases as well as to protect it from failures or outages that could cause serious damage to the organization. This means achieving a careful balance of business continuity and operational efficiency.was the system selected.

Getting Started: Infrastructure Performance Assessment

"We have too much to try and manage to do without automation. What is our baseline? Where are we?"

UTHealth started by assessing their existing IT environment with a Infrastructure Performance Assessment service from Virtana in order to:

1. Select the right storage technologies and products.
2. Optimize configurations; Reduce overprovisioning.
3. Mitigate deployment risks.
4. Safeguard consolidation or migration projects.
5. Implement a change validation process for production SLAs.

UTHealth IPA "aha" moment:

UTHealth was struggling for months to understand inconsistent performance levels at each data center.

Certain applications and processes would run fine in their Citrix ADC environment in one data center and they would see massive delays up to 10x in the other data center with the same underlying infrastructure.

The IPA determined that a Converged Network Adapter (CNA) mismatch was the fault. I/O delays inside the cards produced a load balancing mismatch across the data centers affecting application performance.

IPA analysis found major inconsistencies between data centers. Health checks on multi-pathing, VM health and storage fabrics helped IT to have visibility and optimize their infrastructure to meet the demands of their users.

VirtualWisdom Infrastructure Performance Management (IPM) deployment

Storage resources and network gear are always the easiest to point fingers at. By deployed VirtualWisdom, they attained fact-based answers to eliminate red herrings during IT problem root cause assessments.

UTHealth IT was armed to demonstrate to stakeholders (primarily DBAs) what is going on at each layer of I/O traffic and show the full round trip. Insights into what each layer is doing while providing visualizations and correlations of what else is happening either at the application, DB or at the converged side of the infrastructure is essential in consultative IT troubleshooting processes. UTHealth IT can now show queue depth metrics, VM metrics and, most importantly, can point to the Virtana Trend Matcher Analytics to prove, with data, that "you are not trying to request the data... We don't see these requests coming in to storage fabrics".
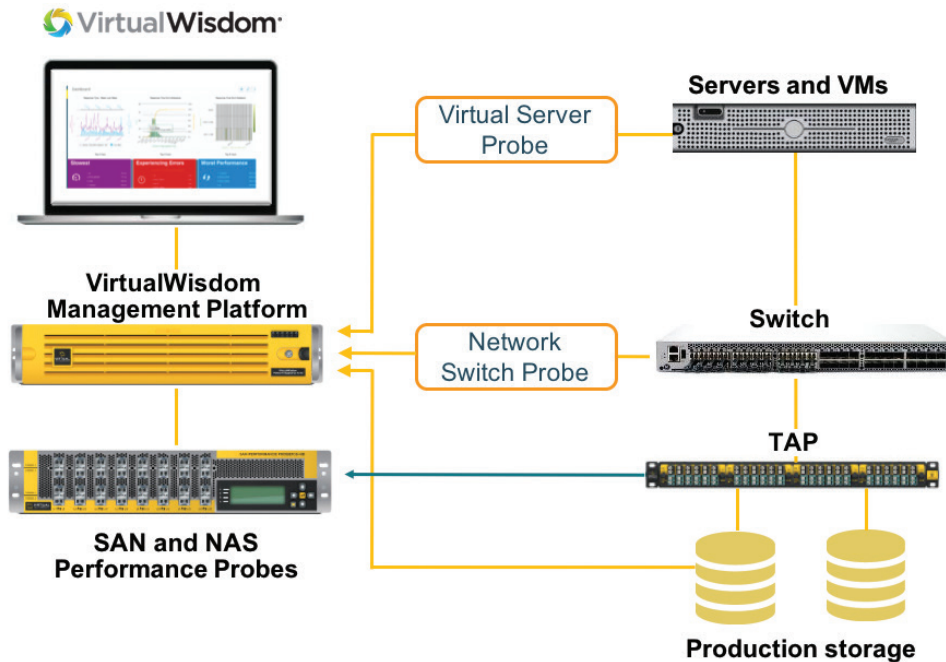
Figure 2: VirtualWisdom Full Deployment Suite

Future Virtana deployments will include visibility into the converged infrastructure architecture natively. UTHealth is converged from the host up to their Cisco Nexus 5000 series switches then diverge and go native Fibre Channel to storage.

The Value of Virtana

The biggest value from VirtualWisdom is in the ability to see what is happening day to day and second to second. The applied analytics available with VirtualWisdom helps to focus on issues that matter most and concentrate on that one big

metric, pro-actively alerting IT to a SAN link that is down. The duration of an outage is also critical. This could be catastrophic if the link is down for more than 5 seconds. Business continuity is at risk if the link is dead and a data center failover occurs.

Continuing to instrument more infrastructure is key to the continued modernization of the UTHealth data centers. The core value of Virtana to make applications and infrastructure work better together is a core value to UTHealth as well.

Customer Benefits

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 Learn more about VirtualWisdom

 Contact a Virtana Expert

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