OPENBENCH LABS

Data Center Management

Analysis: Add Service Management to Server Monitoring To Optimize Physical & Virtual Environments

uptime software

Analysis: Add Service Management to Server Monitoring To Optimize Physical & Virtual Environments

Author: Jack Fegreus, Ph.D.
Managing Director
openBench Labs
http://www.openBench.com
November 03, 2010

Jack Fegreus is Managing Director of openBench Labs and consults through Ridgetop Research. He also contributes to InfoStor, Virtual Strategy Magazine, and Open Magazine, and serves as CTO of Strategic Communications. Previously he was Editor in Chief of Open Magazine, Data Storage, BackOffice CTO, Client/Server Today, and Digital Review. Jack also served as a consultant to Demax Software and was IT Director at Riley Stoker Corp. Jack holds a Ph.D. in Mathematics and worked on the application of computers to symbolic logic.

Table of Contents

Executive Summary

"The ability to respond to common problem situations by automatically triggering standard site procedures is key to implementing IT Service Management (ITSM), which is precisely what *up.time* allows IT to do via the linking of service monitors to basic response actions."

The Path from Asset to Service

For CIOs, today's foremost issue is how to demonstrate that IT is functioning as effectively as the other lines of business. IT credibility is the cornerstone on which every IT initiative, from operational cost cutting to strategic Line-of-Business (LoB) development, will rise or fall. Unfortunately, IT credibility remains shrouded by the age-old problem that many business managers see IT only as a cost-generating black box

openBench Labs Test Briefing:
***up.time*® 5 Server Monitoring & Service Management Software**

1) **Automate Discovery and Collection of Real-Time Data:** *up.time* discovers and collects resource metrics using Web-Based Enterprise Management (WBEM) implementations or *up.time* agents across systems, storage devices, and SAN or LAN switches, which allows IT administrators to rapidly identify and respond to critical performance issues that impact compliance with an SLA (Service Level Agreement).
2) **Manage Resource Utilization and Capacity:** Graph available capacity and resource performance metrics for IT resources over time.
3) **Automate IT Administrator Responses:** Set thresholds on service monitors that automatically respond to service events by triggering workflow actions on physical or virtual systems.
4) **Simplify Service Level Management:** Map IT infrastructure to business applications and services, define Service Level Objectives (SLOs), and map service monitors to SLAs enforced with reports and graphs.

The problem for IT is that no matter how well resources are managed as isolated assets—now often virtual as well as physical—only a limited value can be derived from the devices. Resource properties are not sufficient to address the challenge of delivering IT support as a business service. Worse yet, this leaves IT, especially at small to midsize enterprise (SME) sites, lacking clear links connecting resources to applications and business value.

The problem gets worse in a Virtual Operating Environment (VOE), such as that created by VMware® vSphere®. Multiple levels of logical indirection can often seem chaotic to an administrator without the right tools. The lack of clear links also leaves CIOs facing a broad gulf separating them from other corporate executives.

Corporate executives think in terms of LoB processes. When it comes to services needed to support those processes, they expect IT to go beyond device performance metrics and address higher level process concerns, such as availability and business continuity. To bridge that gulf between CIOs and LoB executives, *uptime software* provides a comprehensive server monitoring and service management package dubbed *"up.time®,"* which is important in any environment a crucial in a VOE

Savvy CIOs understand that assuring critical business processes, services, and transactions starts with the comprehensive monitoring and management of all IT resource infrastructure, including servers, storage, networks, and applications. Nonetheless, the complexity of many comprehensive datacenter management tools makes the out-of-box experience for IT—especially at SME sites with little experience using datacenter class software—a daunting endeavor. To resolve this problem, *up.time* presents administrators with a robust collection of fully functional monitoring services, which can be combined and grouped into very sophisticated hierarchies. As a result, *up.time* empowers IT organizations to monitor, maintain, and optimize a comprehensive array of network resources ranging from storage arrays to applications, beginning on the first day of use.

The real weapon in the battle to reduce burgeoning IT operational expense (OpEx) costs, however, is found in the automation of standard administrator responses to problems. The ability to respond to common problem situations by automatically triggering standard site procedures is critical to implementing IT Service Management (ITSM), which is precisely what *up.time* allows IT to do via the linking of service monitors to basic response actions.

Equally important is the ability to link an automation scheme back to a server monitoring system. This is particularly true in a VOE, where the rational is to create or upgrade systems on demand in order to meet changes in load. For vSphere environments, VMware bundles vCenter Orchestrator with vCenter Server to provide IT administrators with a very powerful tool for automating systems management tasks that are related to VMs and host servers. To avoid the pitfall of automating virtual resource sprawl, *up.time* extends Orchestrator with monitoring actions to enable administrators to generate managed work flows.

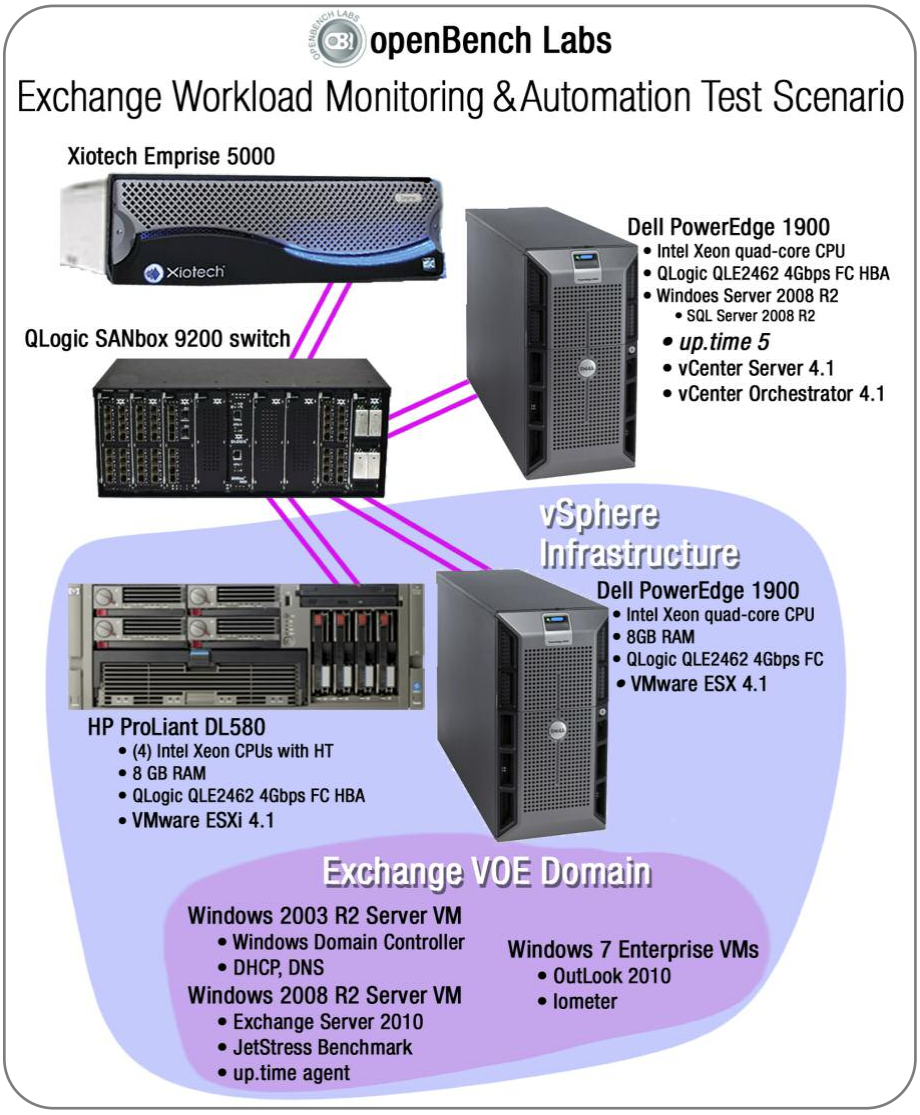
For CIOs, the tangible outcome of IT's use of *up.time* for operations, monitoring, and automation is the ability to create and support Service Level Agreements (SLAs) with the heads of business divisions. Unlike IT software packages that tout the ability to support externally generated SLAs, *up.time* enables IT managers to directly define an SLA and generate the reports required to verify compliance directly within its GUI.

In particular, IT managers can define Service Level Objectives, which are typically high-level availability or performance-centric abstractions taken from detailed service monitoring packages created for IT operations. Several SLOs can then be combined into a single SLA for a specific service. Using *up.time*, IT not only develops an understanding of the interdependencies among resources, hosts, and applications; IT garners a way to demonstrate that understanding at a strategic business level.

Business Continuity SLA Scenario

"We installed *up.time* 5 for deep monitoring of all physical and virtual resources used by our Exchange 2010 workload: Via integration with vCenter Server and Orchestrator, we then extended our ability to manage and support that workload by providing proactive outage avoidance and automated healing."

Virtualization 2.0



For several years, IT has ranked server virtualization as the best way to optimize resource utilization and minimize OpEx costs. Now, many SME sites run from four to eight server VMs on one or more host servers in their production environments.

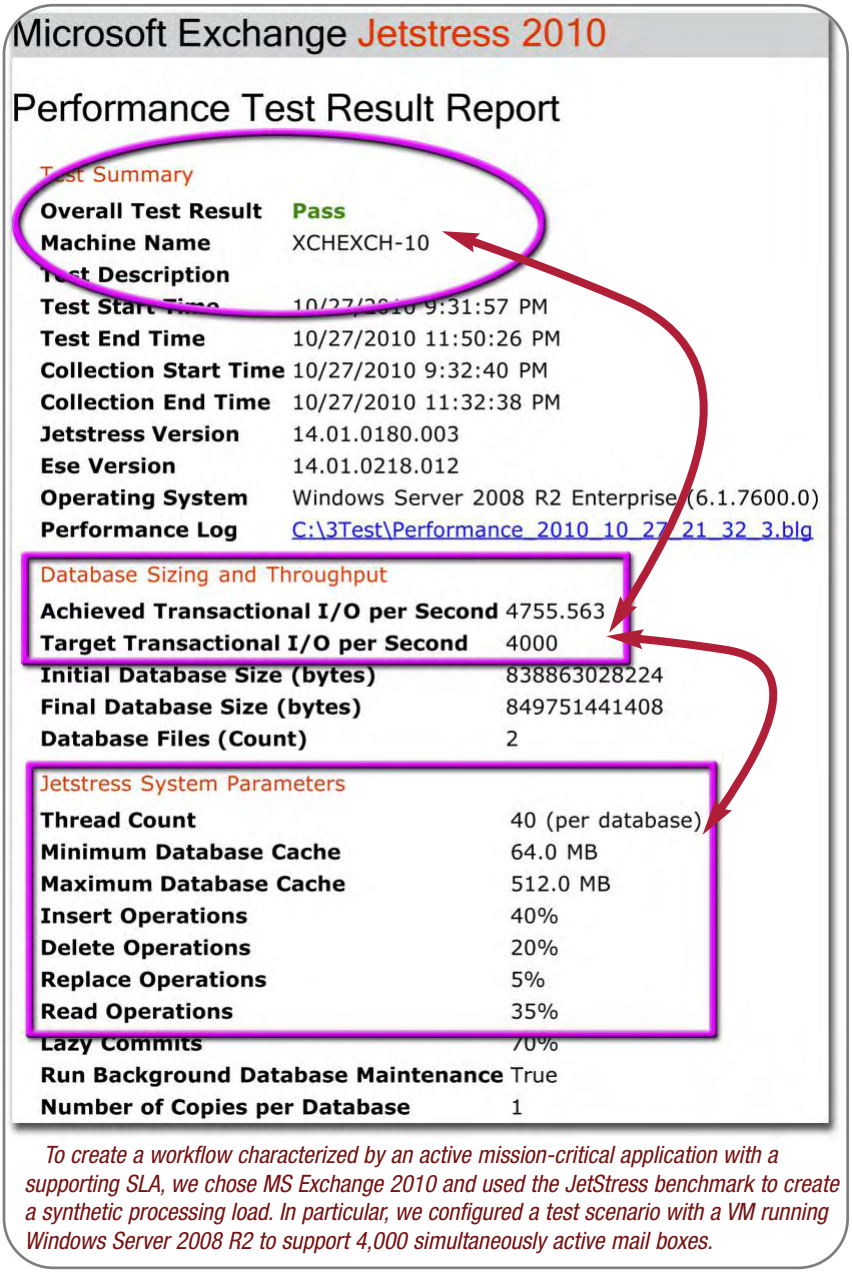
Today's SME VOE implementations are typically characterized as opportunistic consolidation projects for workloads that are not mission critical. More importantly, the relative success of these projects, with respect to ROI, has IT poised to move forward with more aggressive mission critical virtualization projects.

Driving the next wave of virtualization projects are the growing concerns of LoB executives over business continuity in a competitive 24x7 economic environment. For sales and marketing executives, computer downtime

represents more than lost revenue: These executives equate lengthy computer outages with potential losses in customer confidence and market share. As a result, senior LoB executives, expect IT to meet a recovery time objective (RTO) that is measured in hours rather than days and a recovery point objective (RPO) that is close to lossless.

Management by Workload Optimization

Workload Performance Objective



To create a workflow characterized by an active mission-critical application with a supporting SLA, we chose MS Exchange 2010 and used the JetStress benchmark to create a synthetic processing load. In particular, we configured a test scenario with a VM running Windows Server 2008 R2 to support 4,000 simultaneously active mail boxes.

The challenge for IT, especially at SME sites, is to assuage the business continuity fears of corporate executives within budget constraints that exclude costly disaster recovery (DR) components, such as fault-tolerant servers, redundant hardware and software, and standby network bandwidth. The cost-effective solution for business continuity that IT is now embracing is an extended VOE for mission critical applications.

What makes a VOE so attractive to CIOs as a business continuity solution are such capabilities as rapidly restarting, non-disruptively moving, and spawning new instances of VMs in minutes among multiple hosts. In effect, a VOE gives IT operations the ability to create and support a highly flexible active-active site configuration.

By assigning all hardware to a single production resource cloud, an active-active site configuration frees IT from traditional hardware-software allocation issues. IT can focus entirely on the construct of a workload, which has a natural affinity to a service. Using a hierarchy of workloads—from mission critical to deferrable—as fundamental building blocks, IT can respond in minutes to changes in

business processing via the automatic provisioning and moving of VMs. This is a game changer for the perception of IT as a cost center and not a business enabler.

To test a second generation VOE infrastructure hosting a VM running MS Exchange 2010, openBench Labs used two servers running the VMware vSphere ESX 4.1 hypervisor. With vMotion a critical component for a VOE designed to provide enhanced support for business continuity, we installed dual-port QLogic QLE2462 4Gbps Fibre Channel HBAs in all host servers.

All storage for our environment was provisioned from a single Xiotech Emprise 5000. In particular, our host servers shared two RAID 5 volumes which were used as VMware datastores to store disk files belonging to VMs.The VM hosting Exchange 2010 also utilized two RAID 10 Raw Device Mapped (RDM) volumes in virtualization mode, to store a two database files that contained all of the mail boxes.

We used Microsoft's JetStress benchmark to first determine the maximum I/O request load that our configuration could sustain within the benchmark's tight performance constraints, which include an average response time of 20ms. The results of this first test pegged our configuration as able to safely sustain a load of 4,000 IOPS. These results led us to configure Exchange with 4,000 active mail boxes split across two databases in our ongoing stress tests. We did not test any alternative configurations with greater numbers of mail boxes, but a lower active-utilization ratio.

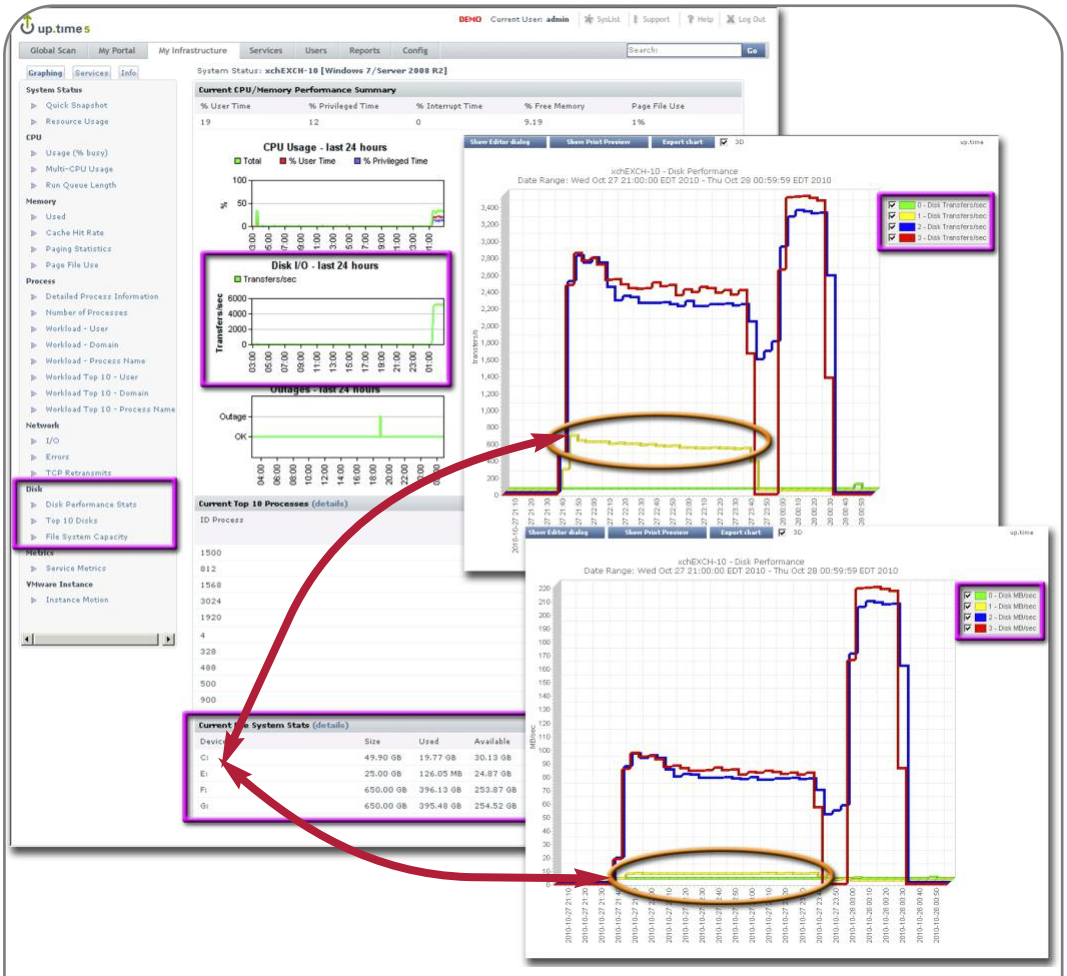
To manage and automate the hosts and VMs in our VOE, we installed vCenter Server 4.1and vCenter Orchestrator 4.1 on a third physical server. We installed *up.time* 5 for deep monitoring of all physical and virtual resources used by our Exchange 2010 workload: Via integration with vCenter Server and Orchestrator, we then extended our ability to manage and support that workload by providing proactive outage avoidance and automated healing.

SLM Automation

> "Virtualized business processes are now found in every enterprise and even underpin entire business models, which explains why LoB executives continue to increase the pressure on CIOs to deliver robust, quality-driven IT services in support of business processes."

From Marketplace to Marketspace

Resource Management



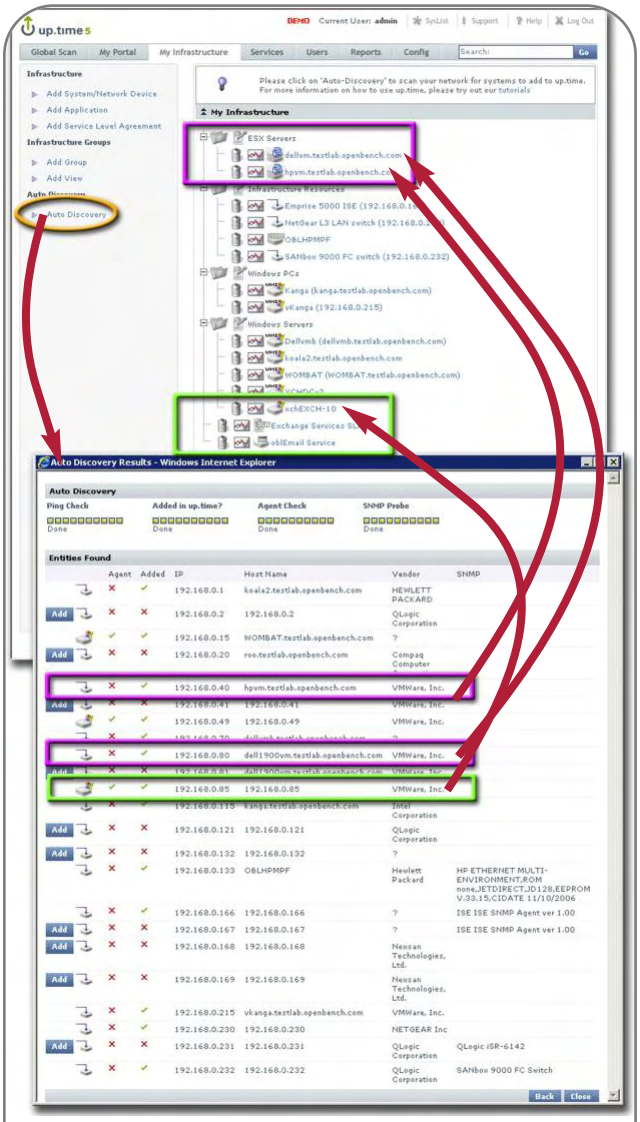
Within five minutes of starting an up.time *5 installation, IT administrators can monitor datacenter resources from a familiar resource management perspective. Drilling down on disk usage on our server VM running Exchange, we discovered that while the log files were active (700 IOPS), actual data throughput (4MB/sec) was negligible.*

In 1995, Jeffrey Rayport and John Sviokla of the Harvard Business School introduced the virtual marketspace: a world of digital assets and virtual value chains. Within months, the McKinsey Quarterly echoed this idea and advised CEOs to integrate process and technology in order to gain competitive advantage in the virtual world of information, as well as, the physical world of real assets.

As LoB Executives grappled with the real problems of virtual value chains, top

business consultants came to the consensus that success hinged on the transformation of IT from a resource-oriented technology provider to a process-oriented business service provider. In effect, IT would need to be able to exploit technology while delivering business solutions that support business objectives.

Resource Classification



Via the up.time auto discovery, we were able to add IT resource nodes for data collection via WMI, an up.time agent, or SNMP. More importantly we were able to group resources in order to automate service monitoring based on infrastructure group membership.

The call to transform IT helped usher in IT Service Management (ITSM), which posits that three issues must be resolved before IT can effectively deliver business-aligned processes and technology. First, IT must be able to demonstrate an unambiguous understanding of the needs of LoB groups. Second, IT needs to implement internal quality control techniques to consistently execute procedures correctly. Finally, IT must be able to isolate the technology used to implement LoB workloads from the delivered services in order to optimize the utilization of IT resources and explore new technologies to process workloads in a structured manner.

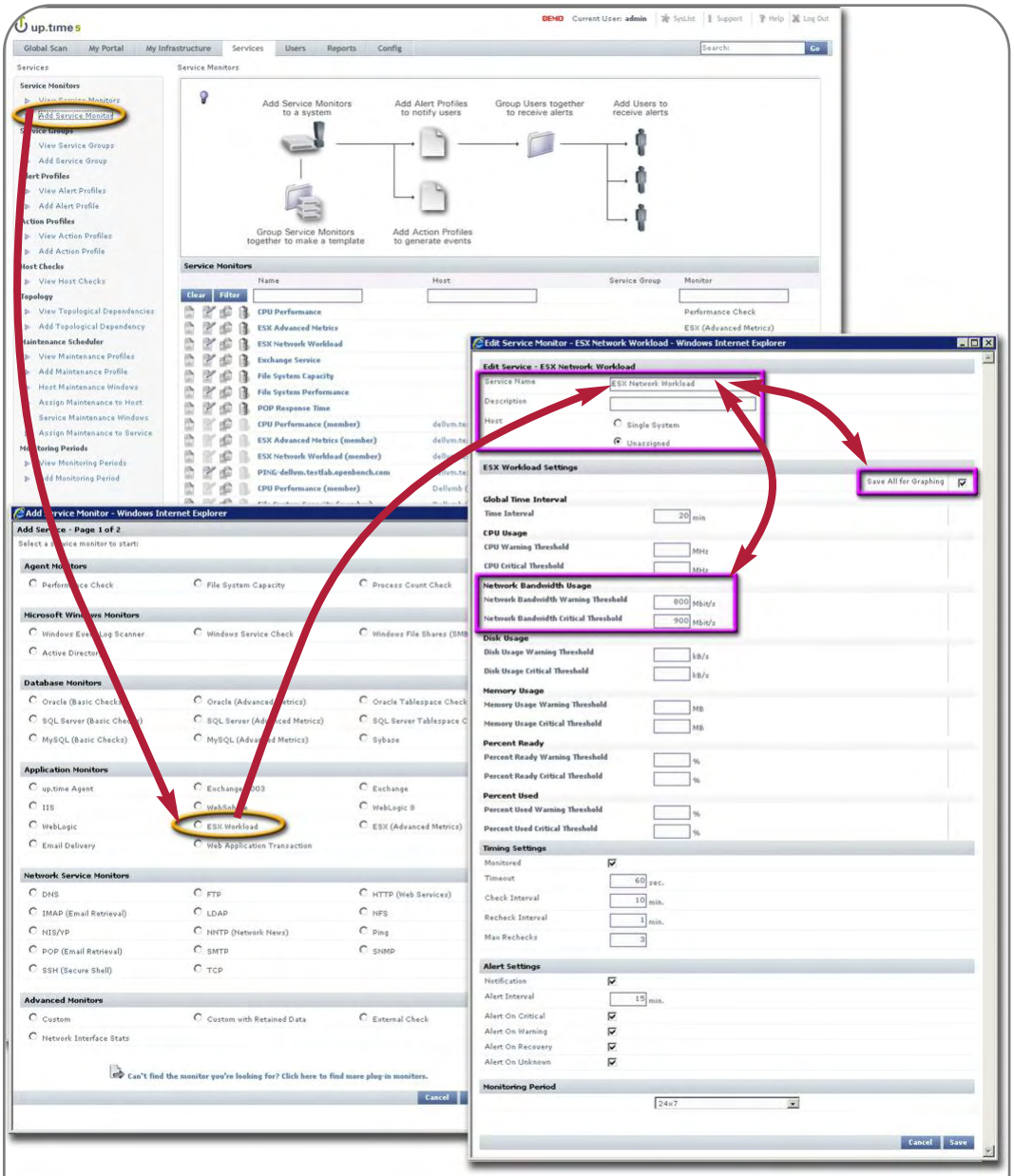
SLM Fast Track

Along with a wealth of business management theory being published on the integration of IT with enterprise value chains, the emergence of ITSM also led to the publication of a new class of enterprise management software of which the lion's share was in the form of large ITSM frameworks. A complex framework, however, does not answer the essential IT need—especially at an SME sites—for an actionable easy-to-use solution that could quickly begin producing a positive return on investment (ROI).

With business processes relying heavily on information technology, anything that delays the ability of IT to execute consistently directly impacts the delivery of enterprise products and services. Virtualized business processes are now found in every enterprise and even underpin entire business models, which explains why LoB executives continue to increase the pressure on CIOs to deliver robust, quality-driven IT services in support of business processes. In particular, LoB executives now expect IT managers to meet a codified level of service in the form of an SLA and to make reports on IT's performance with respect to meeting those service levels.

Nonetheless, an SLA represents a fundamental discontinuity in the IT support model, which makes an SLA difficult for IT to implement. Historically, IT derived service levels for an application from the attributes of the resources supporting the application. An SLA, however, is driven solely by the rationale for the business service, which in turn drives the requirements of the resources that IT must deploy.

Service Monitoring



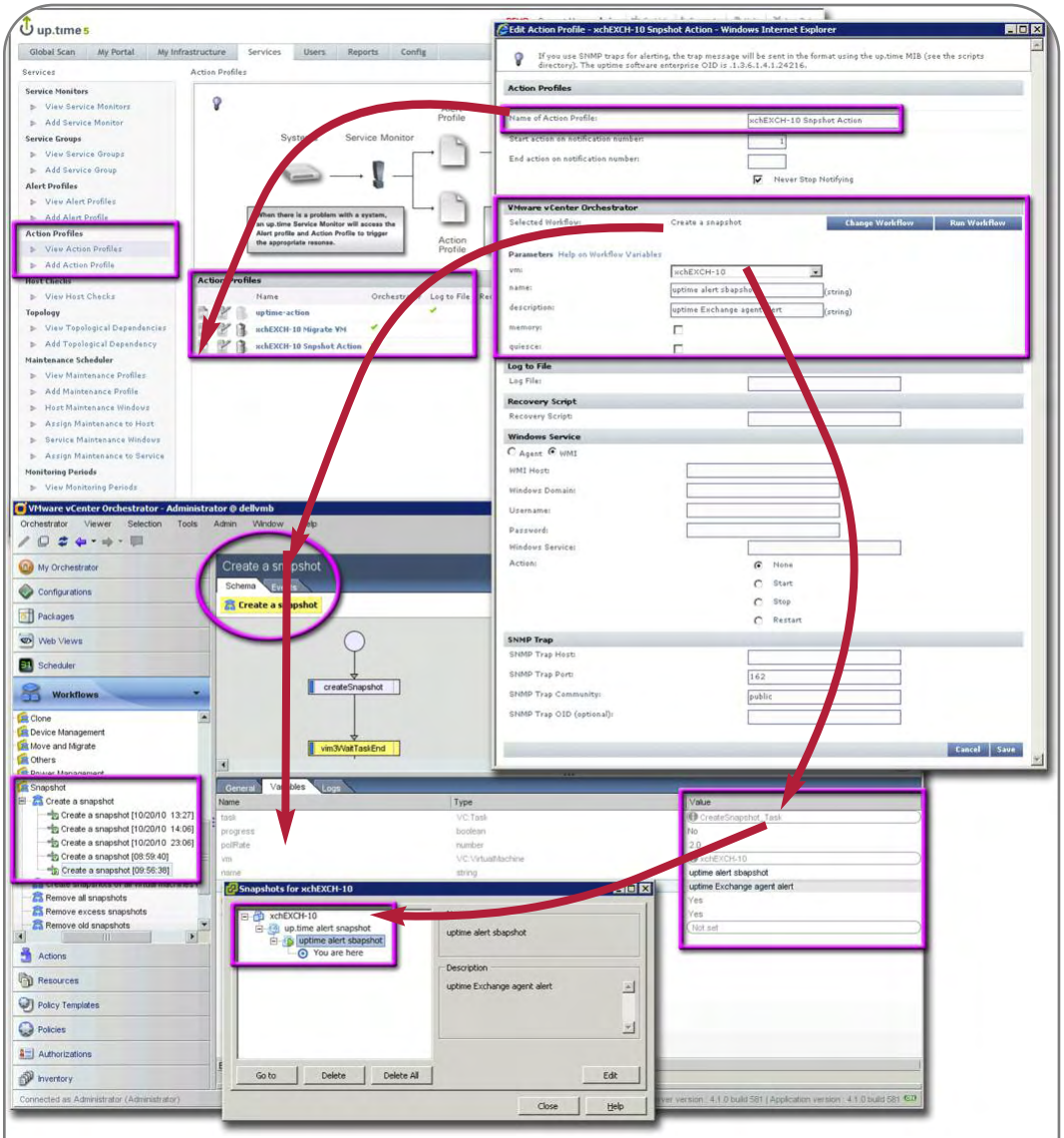
Using the ESX Workload template, we created an ESX Network Workload monitor that monitored all ESX Workload parameters, but only generated an alarm as a 1GBE network connection became saturated.

To assist IT in aggressively monitoring service levels and reporting on Service Level Agreements (SLAs), a new discipline, dubbed Service Level Management (SLM), has spawned under the banner of ITSM. Unlike ITSM, which is involved with all IT governance, SLM is narrowly focused on ensuring that SLAs are aligned to business needs and are administered in an effective, high-quality manner. For *up.time*, the SLM process centers on the identification of a number of Critical Success Factors for end user satisfaction. Dubbed Service Level

Objectives (SLOs), The SLA needs to focus entirely on customer perception.

For IT, SLM value comes through faster identification of performance problems, setting alerts to avoid downtime, and improving process automation. There are numerous service monitor templates in *up.time* for collecting data from systems running a standard OS or a hypervisor. Moreover, each template can be used for many named monitors with each one configured to trigger an alert or action, which represents an automated workflow, based on different alarms or different thresholds.

Workflow Action Automation



We defined an action that created a snapshot of our VM running MS Exchange 2010 through integration of up.time 5 with vCenter Orchestrator 4.1. The action was then linked to our File System Performance monitor, which was set to trigger an alarm whenever the average disk response time on the VM exceeded 20ms. We then assigned that service monitor to a system group dubbed TP Servers. We then assigned our VM running Exchange to that group. As a result, the VM inherited both the monitor and the alarm action.

Each named monitor can be directly assigned to a system or indirectly using a system group. The latter method utilizes inheritance to simplify IT administrator tasks. By adding a new physical or virtual system to a group, that system automatically inherits all of the services, alerts, and actions assigned to the group. As a result, *up.time* service monitoring accelerates a positive ROI by cutting OpEx costs for IT maintenance

while improving IT credibility, which has long suffered from over-promising and under-delivering, while . What's more, performance data collected by *up.time* has an affinity with the capacity planning tasks of IT managers.

Exchange Service Level Management

Our final assesment test was to create and monitor an SLA for our e-mail configuration.. We began by defining a minimum uptime target or 99.5%, which did not include any alotment of time for maintenance tasks. With a weekly compliance period, that meant that the e-mail service could not be down for more than 50 minutes each week. Next, we created three Service Level Objectives (SLOs) as Critical Success Factors for end user satisfaction with our e-mail service: Exchange server uptime, a satisfactory end user experience, and continuous storage availability and response.

To monitor and validate SLA compliance, we applied a subset of our detailed service monitors. Fior Exchange Server uptime, we used a simple network ping. To ensure a satisfactory end user experience, we measure CPU utilization on the Exchange server. Finally tor storage availability and response we measured storage availability on the disks supporting Exchange databases and logs along with the average response time for all disks.

In sharp contrast to the complex ITSM frameworks, up.time provides IT managers with an integrated application that provides a single-pane-of-glass view of performance, availability, and capacity utilization data for physical and virtual resources. What's more *up.time* also includes the tools needed to report IT service quality to business managers. More importantly, *up.time* is very extensible, which allows IT administrators to start with deep server monitoring, rapidly evolve into full-fledged SLM, and then adopt more complex ITSM constructs, all within the single-pane-of-glass metaphor.

Automation of workflows with *uptime* is especially strong when used with vSphere 4.1. By linking *up.time* to vCenter Orchestrator, an IT administrator is able to invoke any Orchestrator workflow, including snapshot generation and VM migration, as an action. In addition, Orchestrator can be linked back to *up.time* to include uptime monitoring when provisioning a VM. This is particularly important for sites automating the on-demand creation and provisioning of desktop VMs for users.

Customer Value

> "The capability of *up.time* to produce statistics showing IT performance with respect to reliability, availability and serviceability (RAS) is critical for rebuilding IT credibility in that it allows IT and LoB executives to regularly raise the bar on SLA standards."

Continually Improve RAS

Today, nearly every business decision maker needs to create value in a real world marketplace of tangible assets and a virtual world marketspace of digital assets and electronic commerce. As a result, LoB executives must pay close attention to the differing processes by which their companies create and add value in each of the two mutually dependent worlds. Only by understanding the differences and interactions among these processes can LoB executives master the tactical challenges and strategic issues facing their organizations.

up.time® 5 Feature Benefits

1) **Automatic Discovery and Agentless Collection:** Accelerated out-of-box experience allows IT to install and implement basic server monitoring in five minutes.
2) **Improve Resource Utilization:** Improve capacity planning and resource utilization to lower CapEx costs.
3) **Automate IT Administrator Tasks:** Define automatic IT responses to event triggers that include vCenter Orchestrator workflows in a vSphere 4.1 environment.
4) **Implement Extended Service Level Management:** Generate SLOs and SLAs that map applications and services to resources to report compliance and improve IT credibility.

Central to bridging the gulf between the marketplace and the marketspace is a strong reliance on IT and for many organizations that's the rub. For LoB executives, a long IT history of over promising and under delivering has left IT distinctly credibility-challenged.

Reputation is based entirely on the perception of others. To rebuild credibility and confidence with business decision makers, the challenge for IT is to embark on a strategy to deliver IT project results through accountability: Proficiency without transparency will not change the perception of IT.

The course of action for IT must start with setting realistic initial expectations for all new projects as a top priority. More importantly, IT must also provide a way for LoB executives to measure IT's ability to meet these expectations.

As an SLM system, *up.time* is provides IT operations managers and administrators with low-cost, easy-to-use, software to monitor the performance and utilization of sprawling resources, predict and plan for future capacity, and report on the Quality of Service (QoS) associated with all IT deliverables. The capability of *up.time* to produce statistics showing IT performance with respect to reliability, availability and serviceability (RAS) is critical for rebuilding IT credibility in that it allows IT and LoB executives to

regularly raise the bar on SLA standards.

With up.time, IT can leverage technology enhancements and even changes in market dynamics to tighten SLAs and raise perceptions of IT competence and accountability by donning the mantle of continuous service improvement. *Up.time* also helps IT adopt the basics of Business Process Management (BPM) through the automation of tasks typically performed by IT administrators in response to disruptive events.

More importantly, up.time positively impacts the bottom line for IT through improved cash flow with reductions in CapEx costs with better resource utilization and capacity planning and reductions in OpEx costs with faster problem analysis and the automation of problem responses.