ESG Lab Review

Dell Foglight for Citrix XenDesktop and XenApp

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Abstract: *This ESG Lab review documents hands-on evaluation and testing of Foglight for Citrix XenDesktop and XenApp at their facilities in Aliso Viejo, California. The test environment was built to reflect a heterogeneous IT infrastructure to demonstrate the ability of Foglight to monitor and manage a Citrix virtualization and application delivery environment, and provide end-to-end visibility across virtual desktops, virtual servers, networks, storage, and other physical and virtualized IT infrastructures while diagnosing and resolving performance and availability issues and communicating critical state and service quality information to stakeholders quickly, clearly, and completely.*

The Challenges

As the number and variety of users and devices in IT environments grows, so too does management complexity. This is especially true for larger environments with a heterogeneous mix of physical and virtual server, network, and storage resources. With each resource within the infrastructure generating important and potentially insightful data, IT administrators need an easy way to analyze and understand that data, from existing resource consumption to potential performance problems, in order to intelligently respond to current business needs and future business requests as quickly as possible. The continual drive for business process improvement requires more than just changing roles and new paradigms. Organizations also need to transform their infrastructures into more agile and flexible IT environments by leveraging new technologies and management tools.

Increasing server and desktop virtualization and private cloud infrastructure are perennial IT priorities for many organizations and all appear in the top-ten IT priorities reported by respondents to ESG's *2015 IT Spending Intentions Survey*.[1]

Virtualization—both server and desktop—as well as cloud infrastructure are all driving an increase in the size and complexity of IT environments. Virtual desktops, virtual servers, data storage, and virtual application delivery in Citrix environments create interdependencies that can be complex and opaque to administrators. Other drivers of efficiency and business competitiveness, such as data center consolidation and big-data initiatives, also contribute to complexity.

Organizations need tools to effectively manage these expanding environments. These solutions must give IT the ability to accurately visualize the environment, analyze the interconnected systems and services running in the environment for fast troubleshooting and remediation, and optimize the environment to reduce both capital and operational expenditures.

Existing tools are often designed with physical environments in mind and are challenged when it comes to providing the following services to users:

- Cross-domain and cross-vendor (end-to-end) visibility–the ability to immediately see the dependencies and relationships that permeate the Citrix VDI and virtual application delivery environment, especially with heterogeneous multi-vendor implementations.
- Diagnosis and resolution of end-user performance issues and root cause determination in virtualized Citrix environments.

[1] Source: ESG Research Report, *2015 IT Spending Intentions Survey*, February 2015.

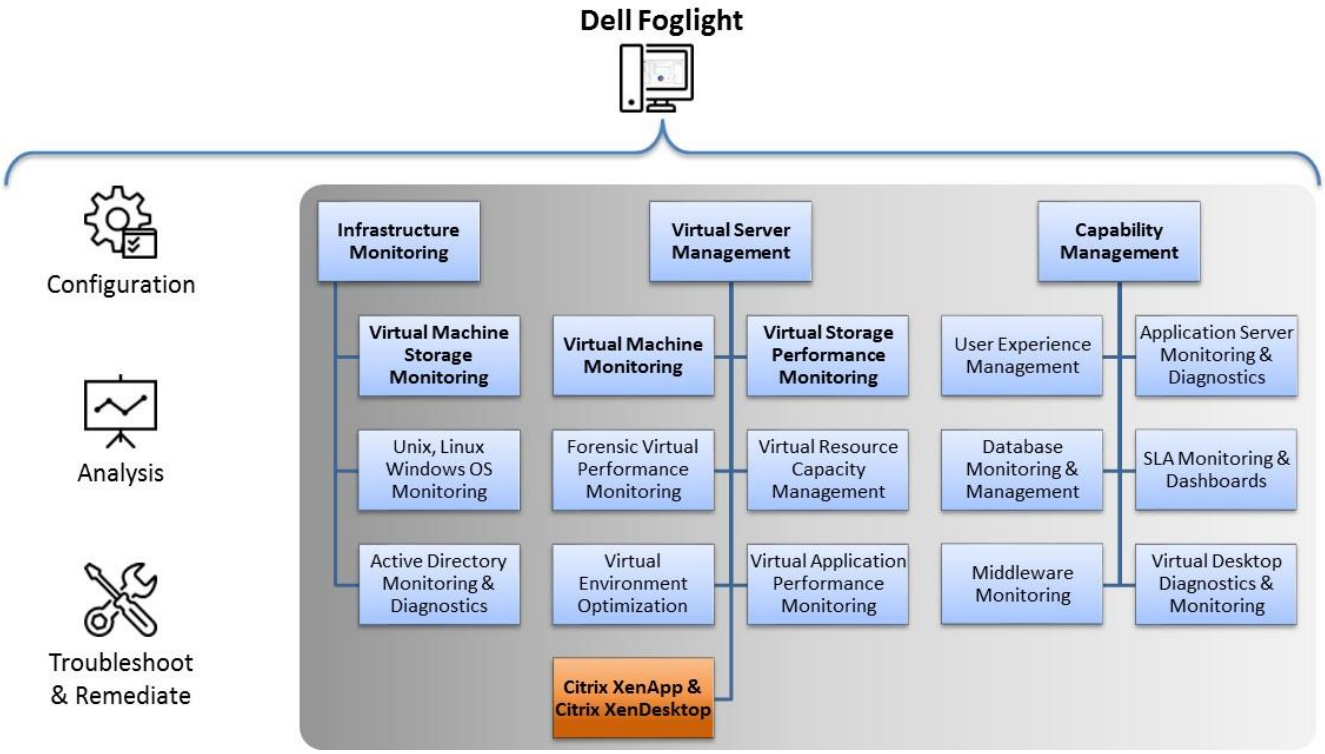
- Service-level agreement (SLA) reporting to enable stakeholders to quickly and completely understand how the Citrix infrastructure is supporting the business.

As organizations continue to mature their virtualized environments and build out private clouds, they will need solutions that enable future growth and agility, not hinder their progress. This ESG Lab Review will focus on Foglight for Citrix XenDesktop and XenApp, part of the Foglight family of products, and will demonstrate how Foglight for Citrix XenDesktop and XenApp capabilities in highly virtualized environments can improve the efficiency of the IT environment, helping IT to better align with the business.

The Solution: Foglight for Citrix XenDesktop and XenApp

Users need end-to-end visibility into these complex virtualized environments. With Foglight, IT has a set of tools, organized by IT capability, through which to monitor and manage all aspects of their heterogeneous environment.

Figure 1. Foglight – IT Infrastructure Monitoring and Management



Foglight is designed to help IT lower the operational cost of managing complex, heterogeneous environments; mitigate the risk of downtime; improve staff productivity; improve compliance with application, database, and infrastructure end-user SLAs; reduce incident counts; improve resolution time; and provide visibility for IT and business stakeholders. A modular environment, Foglight provides different functionality, called "cartridges," based on IT capabilities.

- **Infrastructure Monitoring**—Foglight provides consistent management for all diverse operating systems by monitoring the infrastructure that supports critical applications from every perspective, including operating systems, virtual servers, and virtual machines. Foglight's infrastructure monitoring solution helps link all the disparate parts of the IT environment into one centralized platform.
- **Virtual Server Management**—Foglight provides deep visibility into VMware, Hyper-V, and Red Hat KVM virtualization environment performance management issues, enabling faster problem diagnoses and resolution, and allowing organizations to use hardware more efficiently. Virtual server monitoring and capacity management provides monitoring, optimization, change analysis, capacity planning, service management, and chargeback.

- **Capability Management—**
  - **User Experience Management** – Using multiple perspectives, Foglight analyzes and manages performance SLAs by detecting, isolating, and resolving response time issues, and capturing and replaying real user interactions to understand how application design and configuration affect the user experience. Foglight also monitors and analyzes transaction conversions and session metadata to uncover new buying patterns and preferences, as well as determine why users abandoned transactions.
  - **Application Server Monitoring and Diagnostics** – Foglight, with monitoring and diagnostics, simplifies the management of the application server, the user transactions on the server, and the underlying infrastructures. This enables IT to resolve problems before the problems impact users and violate SLAS.
  - **Database Monitoring and Management** – Foglight database monitoring tools provide performance monitoring and management across heterogeneous database platforms, helping reduce administrative costs and improve service levels.
  - **SLA Monitoring and Dashboards** – Foglight improves service quality and reduces service disruptions through the creation of SLA policies using data based on performance, availability, and change from across the IT environment.
  - **Middleware Monitoring** – Foglight monitors the health of the middleware environment and enables resolution of incidents before they become issues for the business.
  - **Virtual Desktop Diagnostics and Monitoring** – Organizations accustomed to managing physical desktops lack the knowledge and tools to manage the virtual desktop. Foglight provides diagnostics and performance monitoring, enabling IT to transition from the physical to the virtual, and to maintain the efficiency of the virtual desktop infrastructure.

Foglight for Citrix XenDesktop and XenApp provides tools to visualize, analyze, and optimize the entire Citrix XenDesktop and XenApp environment with in-depth analysis and expert advice. To ensure optimal server performance and availability, Foglight provides actionable insights that help detect, diagnose, and resolve potential issues from the application, through the virtualization and network layers, to the physical disk spindle. Foglight for Citrix XenDesktop and XenApp provides:

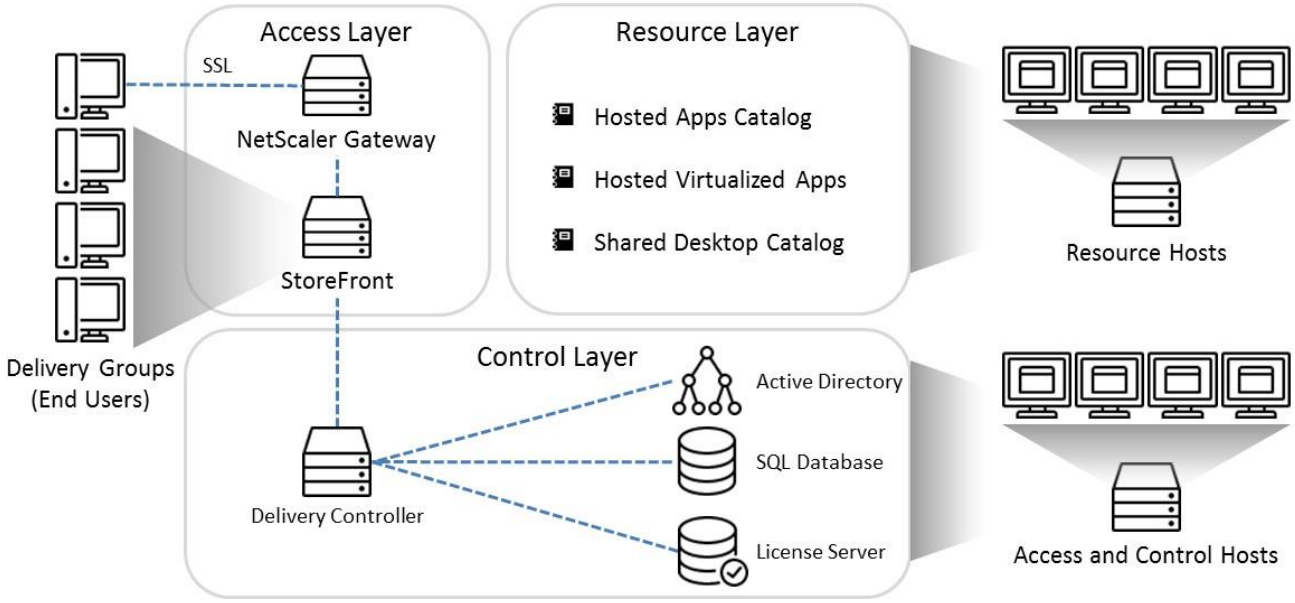
- Detailed architectural representations to bring attention to areas of critical concern and highlight abnormalities.
- Logical representations of components and groups of components, providing a view of overall Citrix XenDesktop and XenApp health and relationships between components.
- Visual identification of XenDesktop and XenApp components residing on virtual infrastructure to aid troubleshooting of issues directly in the virtualization layer.
- Reduction in the mean time to resolution using detailed alarms, best practices, and incident predictions as well as data on deviations and operational issues.
- Detailed visibility regarding the consumption and performance of resources, including license usage, delivery groups, sessions, Citrix Independent Computing Architecture (ICA) protocol and storage latency and round-trip time, and Active Directory performance.
- The dashboard provides detailed answers to frequently asked questions about performance, the environment, and capacity.

With complete visualization into storage performance, IT can proactively resolve problems before they affect customers and end-users.

ESG Lab Tested

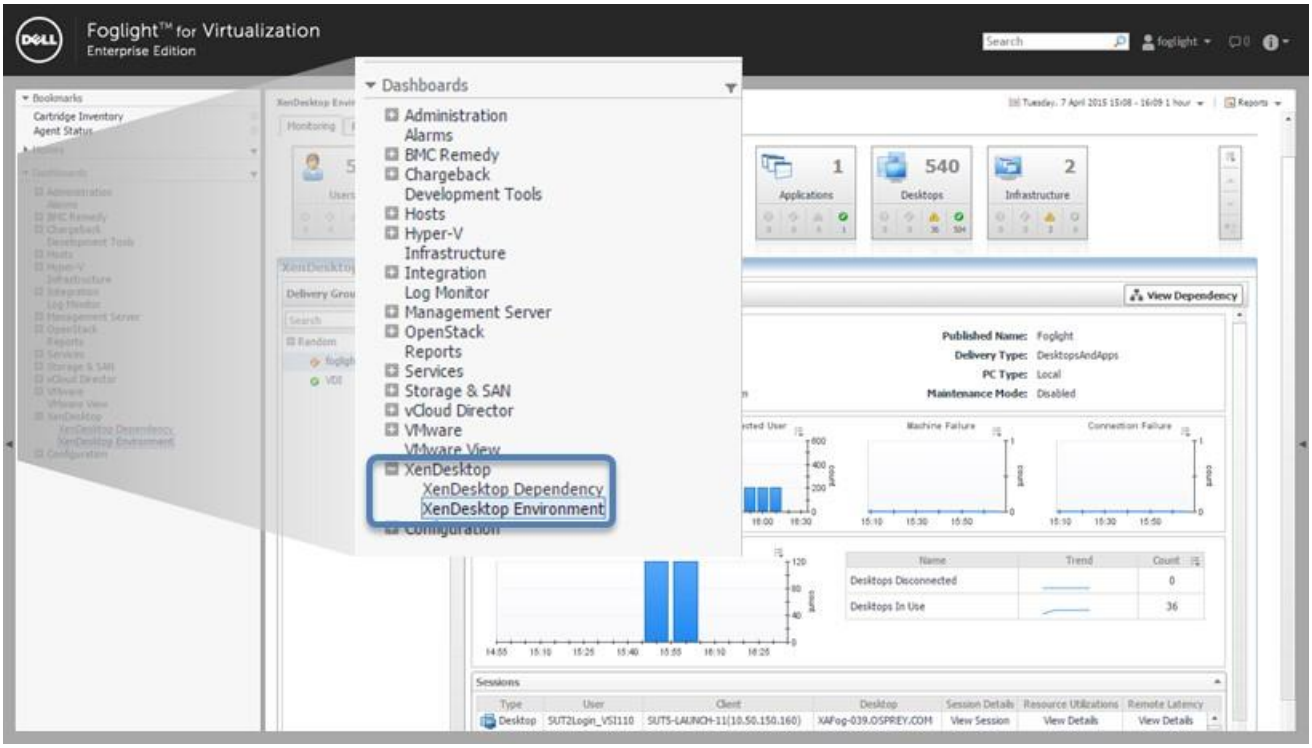
First, ESG Lab examined Foglight as a tool for consolidated management of the Citrix XenDesktop/XenApp environment. ESG Lab used a test bed composed of physical and virtual servers running simulated business applications on a heterogeneous infrastructure. The servers were connected to storage over a heterogeneous SAN fabric, and providing virtual desktops and applications using a Citrix VDI Architecture, as shown in Figure 2.

Figure 2. ESG Lab Test Bed



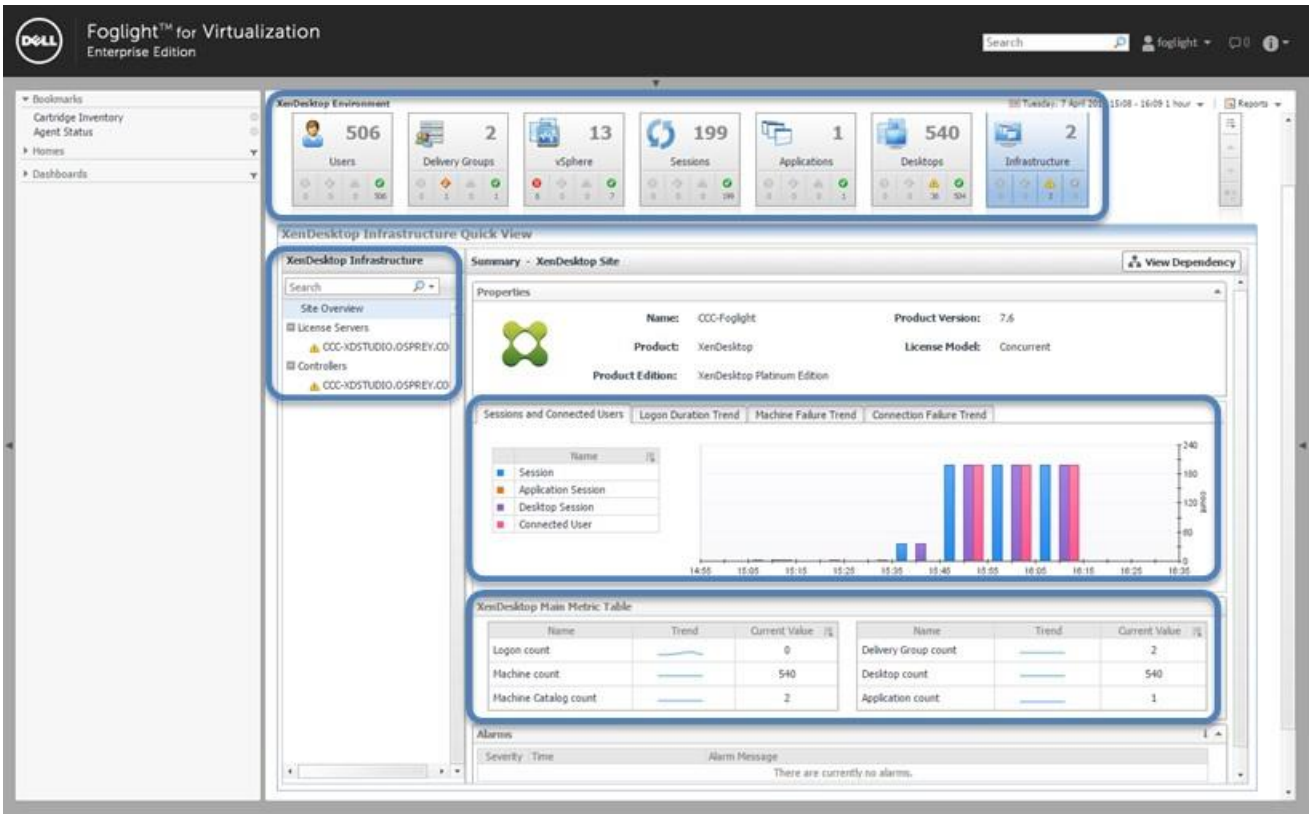
Foglight solutions are all accessed using a standard web browser, and are tightly integrated. ESG Lab entered the URL for the Foglight server and logged in. All of the dashboards for the various Foglight cartridges can be accessed from the left-side menu pane, as shown in Figure 3.

Figure 3. Dell Foglight Home Page – Dashboard Selection



To start exploring Dell Foglight's Citrix XenDesktop/XenApp monitoring and management, ESG Lab clicked on the "XenDesktop Environment" button from the left-side menu pane. This brought up the XenDesktop Environment dashboard (Figure 4). This dashboard provides a summary overview of Foglight's monitoring of the entire XenDesktop/XenApp infrastructure.

Figure 4. XenDesktop Environment Dashboard

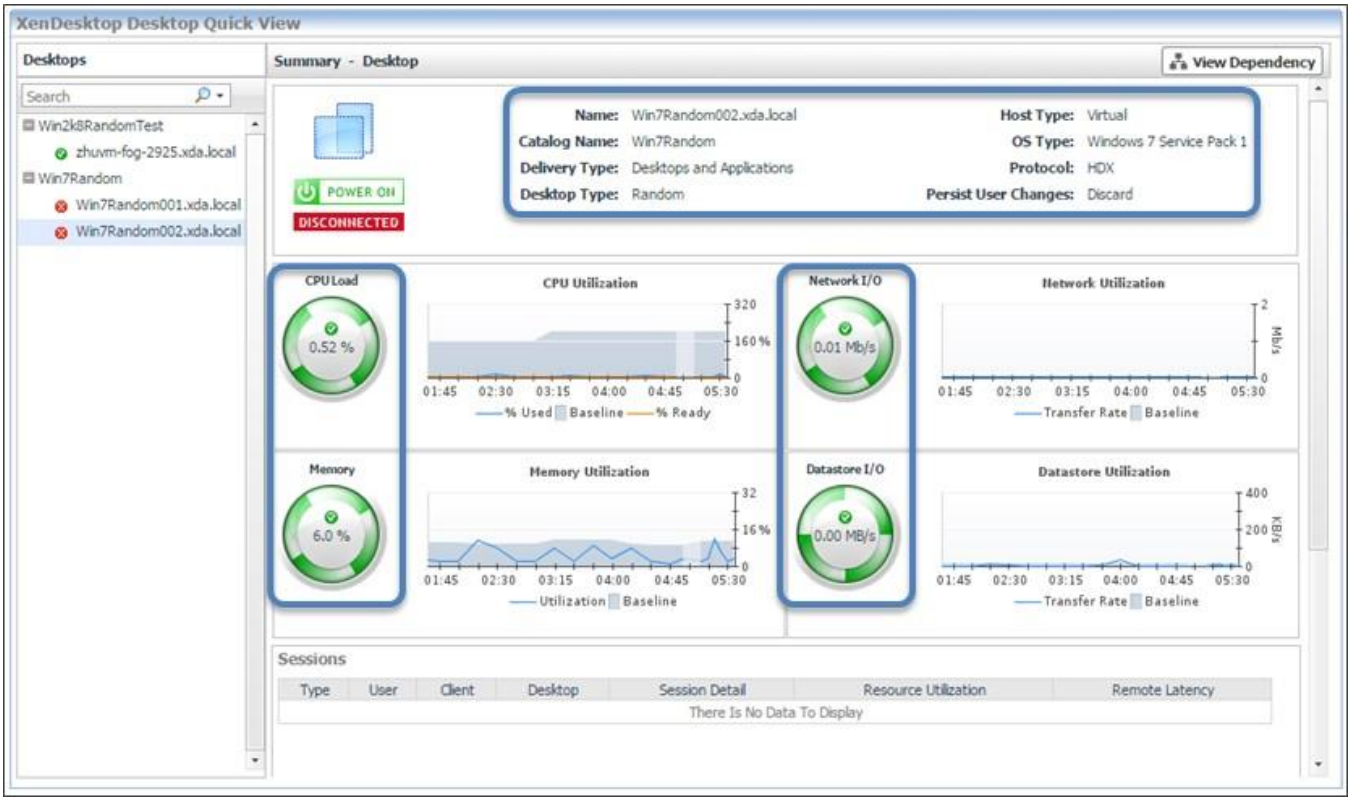


At the top of the dashboard is a summary overview of the health of the environment, categorized by type of component in the XenDesktop hierarchy. In this case, the focus of this view is at the infrastructure level. The site overview shows the license servers and delivery controllers in the environment. The bottom half of the dashboard has tabs that identify session, logon, connection, and machine information. Under that is a table showing the main XenDesktop metrics.

This single dashboard can monitor multiple sites, controllers, and controller services simultaneously, giving an administrator vital information about the Citrix environment at a glance, including performance, utilization, and error data and trends.

ESG Lab next clicked on the Desktops box to look at desktops in the environment. This reloaded the dashboard with summary information for the individual desktops. From the left side expansion menu, ESG Lab selected one of the Windows 7 desktops which brought up the XenDesktop Quick View. Foglight displayed monitoring data for this specific virtual machine, as shown in Figure 5.

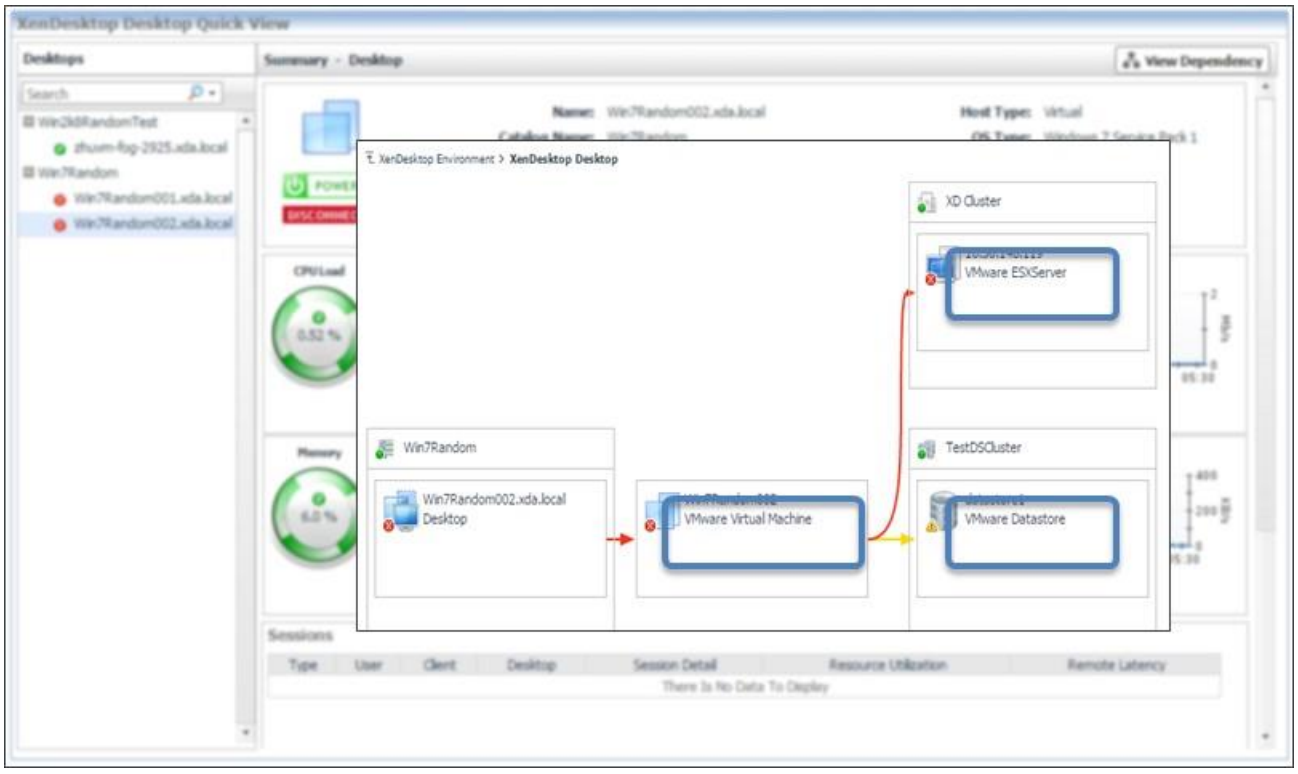
Figure 5. XenDesktop Quick View



This explorer view enables administrators to monitor virtual or physical desktops from the same interface. General system information is displayed at the top, with resource utilization below. Foglight identifies this desktop as running on a virtual machine.

Next, ESG Lab used the virtual machine explorer to drill down into the topology of the infrastructure for this specific virtual desktop, the end-to-end topology was displayed—showing the local desktop, the virtual machine, the ESX server, and the VMware datastore—as shown in Figure 6. Each component in the topology is a live, clickable object. Clicking on any object will take the user to a detail screen showing the status and health of that object.

Figure 6. Virtual Machine Explorer—Topology View



Foglight can provide end-to-end monitoring and management of the entire end-user experience. Foglight collects metrics from NetScaler and provides analysis in summary for the whole environment, and in detail for individual sessions. ESG Lab selected sessions from the XenDesktop Environment Dashboard, which brought up the session overview seen in Figure 7. Foglight captures the total session count as well as top session count by user, ICA round trip time, WAN latency, WAN throughput, and packet retransmits.

Figure 7. XenDesktop Session Quick View—Session Overview

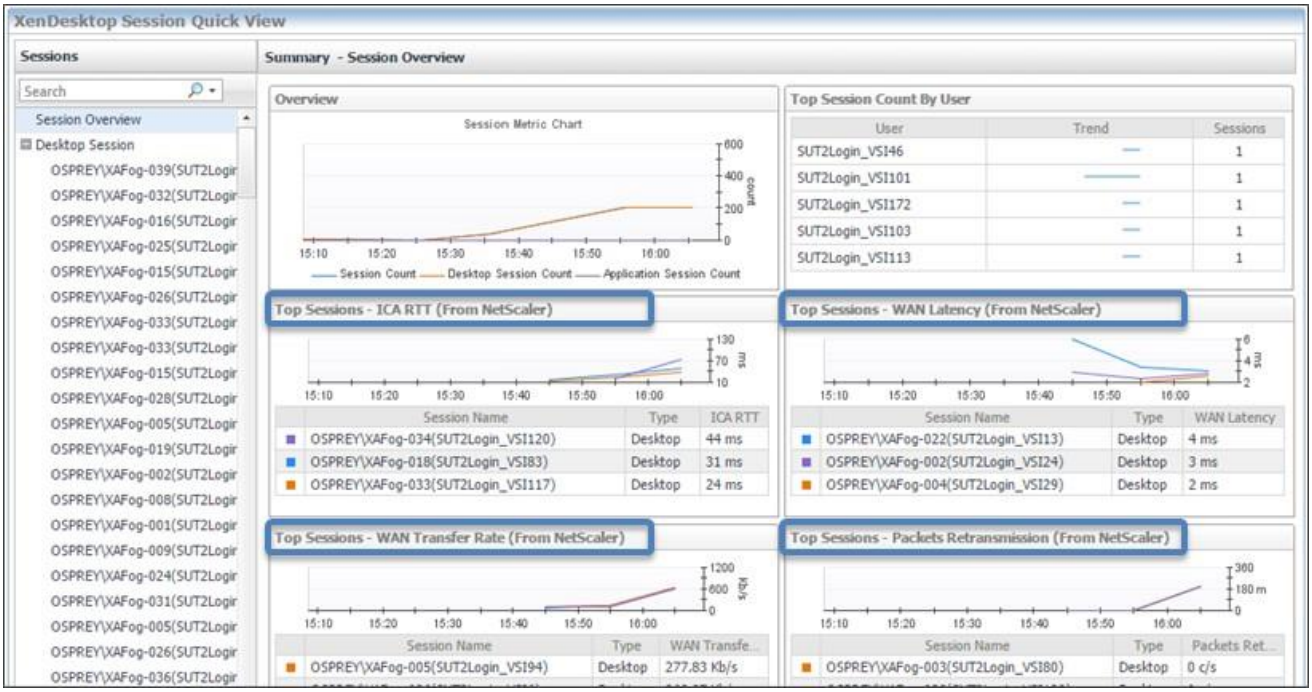
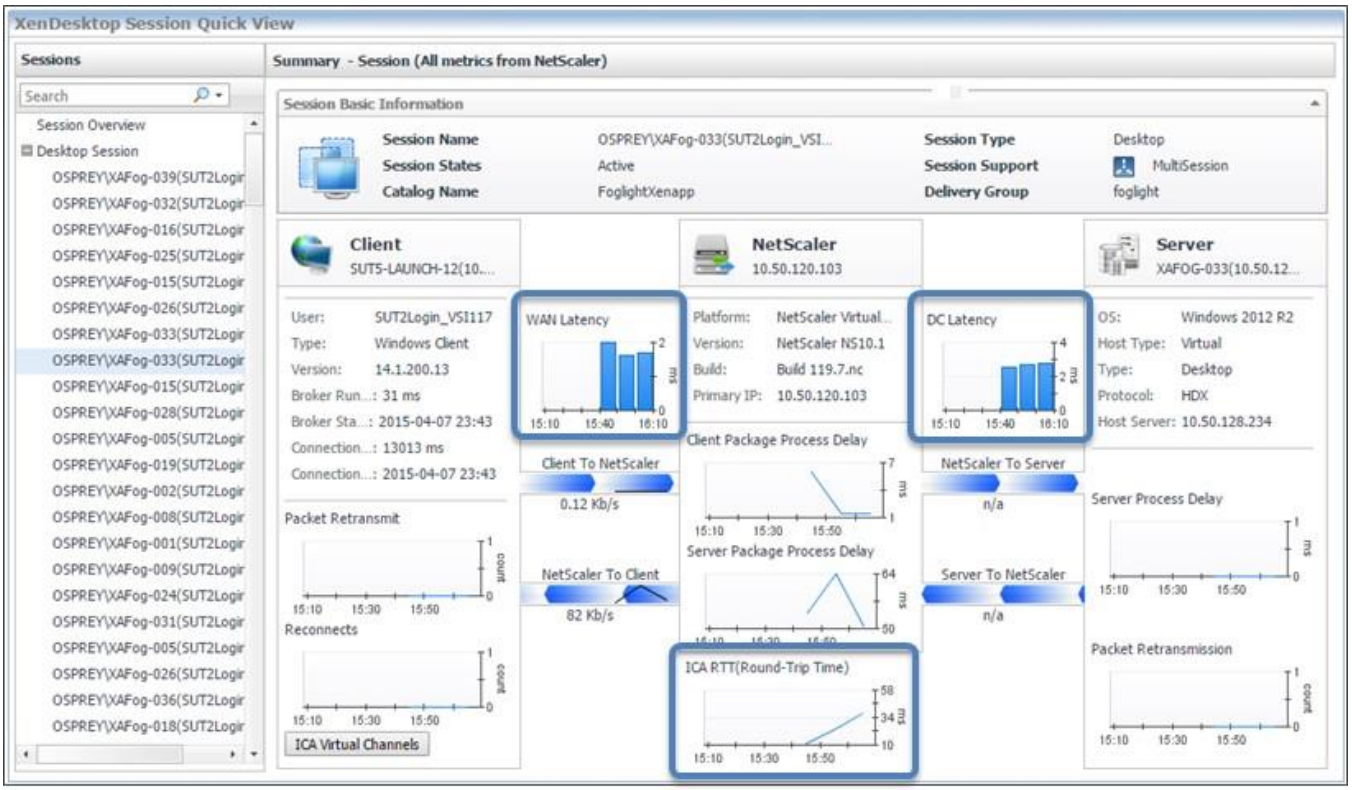


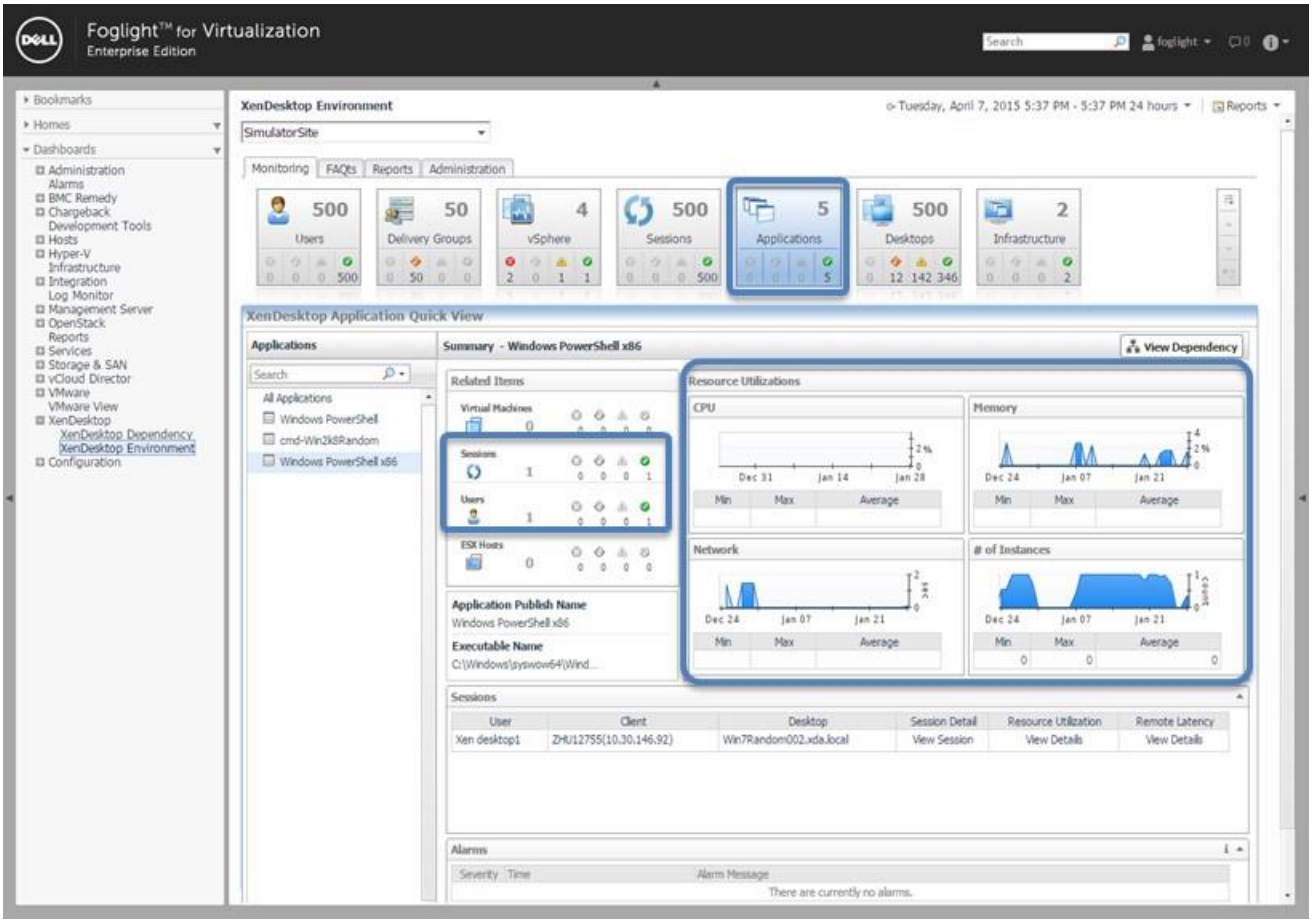
Figure 8 shows the explorer view of a specific session, breaking out WAN latency, data center latency, and ICA round trip time.

Figure 8. XenDesktop Session Quick View—Session View



Finally, ESG Lab clicked on Applications to reveal a summary view of the applications in use by all users. Foglight provides aggregate CPU, network, and memory utilization as well as the number of instances of each application, as seen in Figure 9, with the ability to drill down to facilitate identification of performance issues users may have with specific applications.

Figure 9. XenDesktop Dashboard—Application Summary

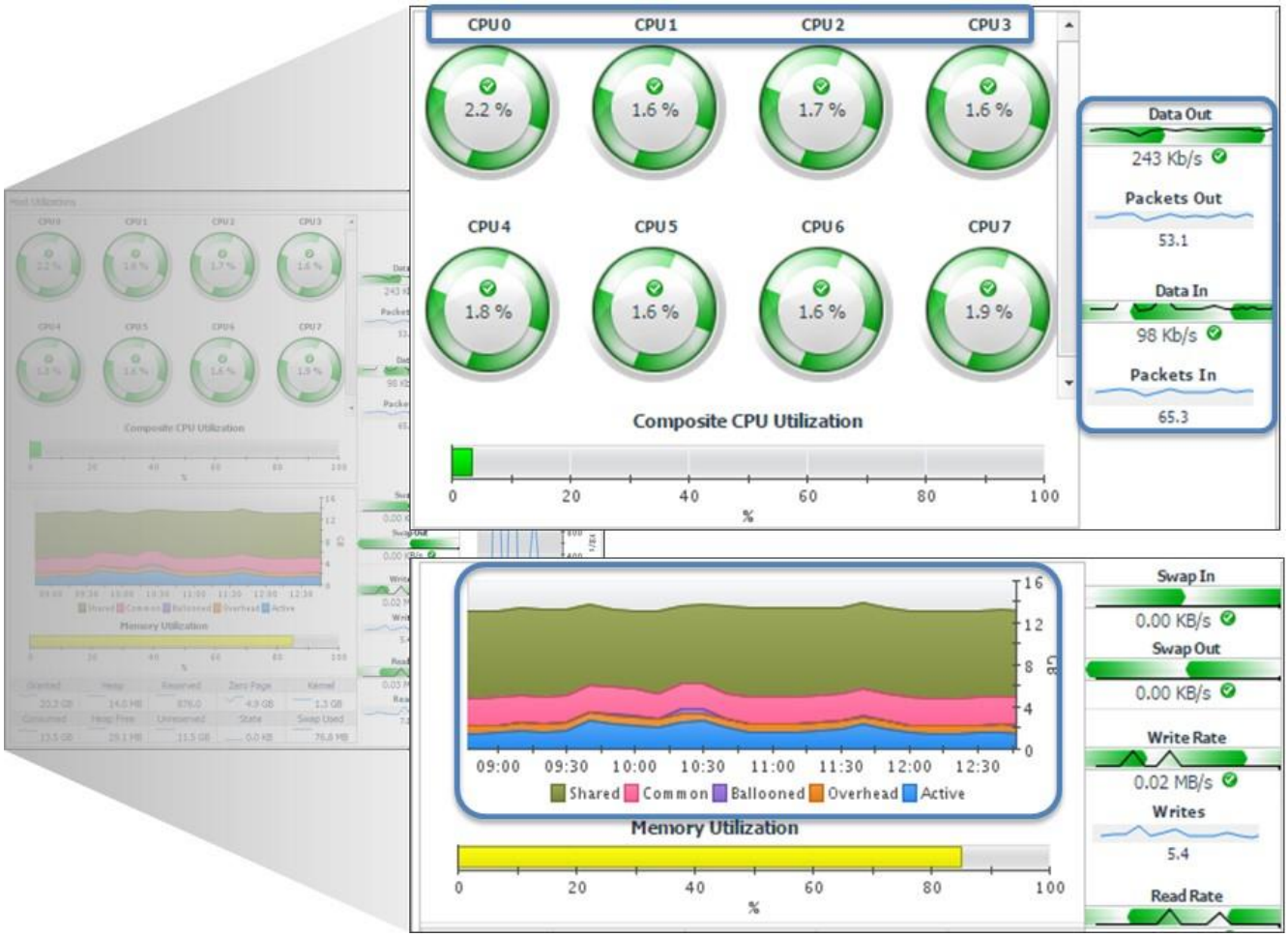


As with all of the graphs in Foglight, these charts are all clickable, which will call up larger charts with more detail.

Foglight for Citrix XenDesktop and XenApp leverages Foglight for Virtualization and Storage Management to enable administrators to determine the root causes of performance issues and assist in remediation. Even transient, unpredictable issues can be readily addressed. Users can scroll back in time to precisely when a performance issue was reported and examine exactly what was affecting performance at that moment in time.

In this example, ESG Lab chose a VMware infrastructure host—an ESX server—and drilled down to get an in-depth view of VMware performance underlying the Citrix environment.

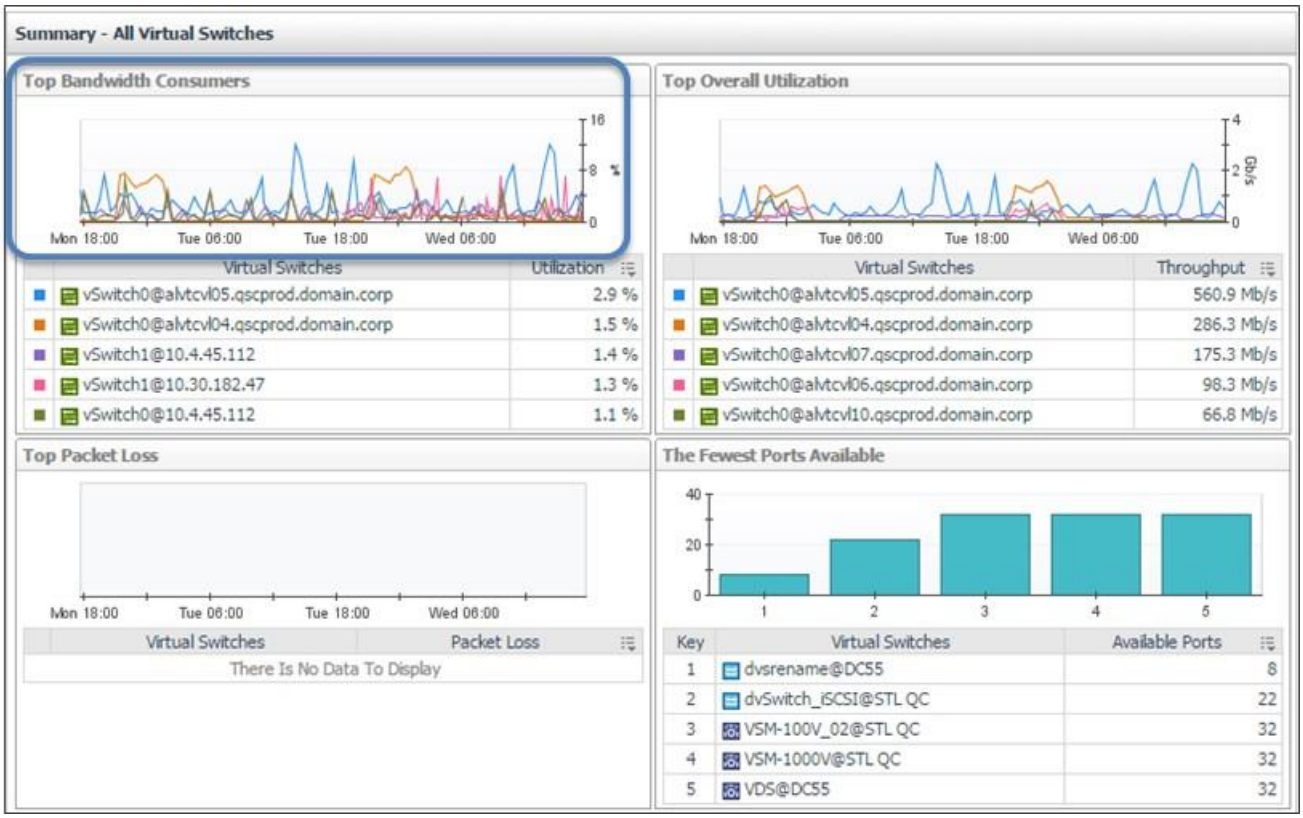
Figure 10. VMware Infrastructure—ESX Host



As Figure 10 shows, Foglight provides detailed views of CPU, network, and memory utilization and can correlate change events and calculate the impact of each change to measure the impact these events might have on the environment. This enables Foglight to make predictive alerts and recommendations.

Figure 11 shows the Virtual Switches Summary, which can help to identify the top consumers of bandwidth, or packet loss in the VMware network infrastructure.

Figure 11. VMware Infrastructure—Virtual Networks



In previous reports, ESG Lab examined the Foglight Active Directory, Storage Management, and Virtualization cartridges.[2,3] These detailed views of the infrastructure, correlated with users and applications, enable quick identification of issues that may not be visible on a specific virtual machine, but may be caused by an adjacent machine—aka the "noisy neighbor"—or some other system or element that would be otherwise invisible to an administrator.

Why This Matters

In a recent ESG research survey, organizations report increasing their use of server virtualization and managing data growth as top IT priorities.[4] As IT begins to virtualize more systems and production applications, they are compelled to strike an optimal balance of performance, availability, and cost-effectiveness. Clear visualization of the interdependencies and utilization of users, desktops, applications, and infrastructure is the first step toward this ambitious goal.

Dell Foglight understands virtualization, desktop, server, network, and storage infrastructure, while enabling data center managers to visualize the relationships between physical and virtual machines, shared storage, and networks. Dell Foglight also has a deep understanding of Citrix XenDesktop and XenApp. Sophisticated analytics enable Foglight to analyze performance and utilization, and make actionable recommendations to correct issues and optimize the environment. Using Foglight, ESG Lab was able to visualize the desktop, application, and virtualized infrastructures underpinning the Citrix XenDesktop environment and identify critical interdependencies. Without Foglight, performing these tasks in a large virtualized environment could take hours, or even days, to gather, analyze, and correlate the data.

[2] Source: ESG Lab Validation, *Dell Foglight for Storage Management*, July 2014.
[3] Source: ESG Lab Review, *Dell Foglight for Active Directory*, March 2015.
[4] Source: ESG Research Report, *2015 IT Spending Intentions Survey*, February 2015.

The Bigger Truth

Complexity is on the rise in IT environments as the variety of users and devices IT needs to support grows. Large heterogeneous environments with a mix of physical and virtual server, network, and storage resources present a particularly challenging management problem. IT administrators need to be able to analyze and gain insight from the torrent of data being generated by each resource within the infrastructure. From existing resource consumption to potential performance problems to intelligent response to current business needs and future requests, IT needs to be able to respond as quickly and effectively as possible. Business process improvement requires organizations to transform their infrastructures into more agile and flexible IT environments by leveraging new technologies and management tools.

With new products and solutions from different vendors being added to fill gaps or fix problems, how can IT be confident that performance requirements are being met? The amount of potentially useful data being generated by each solution is daunting, and analyzing all of it in a timely manner to proactively resolve issues and better respond to business needs is nearly impossible.

Dell Foglight for Citrix XenDesktop and XenApp works together seamlessly with all other Foglight cartridges, including Dell Foglight for Virtualization and Storage Management. The combination is engineered to provide monitoring, management, and advanced analytics into a flexible, scalable solution that can help IT take control of a growing, heterogeneous, virtualized application delivery, desktop, server, and storage environment. While Dell Foglight supports visibility of virtual and physical machines in a VMware, Microsoft Hyper-V, or Red Hat KVM environment, it does not yet support server virtualization solutions from other vendors (e.g., the Xen Hypervisor or KVM). As server virtualization continues to grow in popularity, it will become important to support virtual machines in a heterogeneous operating environment.

ESG Lab confirmed that organizations can use Dell Foglight to easily visualize and monitor a virtualized, multi-vendor environment made up of diverse server, network, and storage resources, while leveraging automated, actionable insight and advice to monitor and manage an enterprise-wide Citrix virtual desktop and application delivery infrastructure. Performance metrics were constantly being captured and analyzed, with near-real-time data as well as historical data available nearly instantaneously as ESG Lab analyzed the environment and investigated performance anomalies. Finally, Dell Foglight demonstrated cross-domain intelligence and optimization capability, connecting virtual machine performance to the underlying servers, networks, and storage, enabling IT administrators to quickly identify and resolve issues.

As organizations continue to invest in and deploy virtualization technologies across server and storage domains, user authentication and authorization become ever more critical. It is important to remember that technology itself will only take the environment so far. In order to enable IT to rapidly adjust to business needs, sophisticated and tightly integrated management software will be the key to long-term success. Organizations in need of a solution to continuously monitor Citrix XenDesktop and XenApp environments and easily identify and understand the source of performance and availability issues would be smart to take a close look at Dell Foglight for Citrix XenDesktop and XenApp, as it is worthy of serious consideration.