

# Lab Validation Report

## **Virtual Iron**

**Virtualization for Server Consolidation and Advanced Management**

**By Brian Garrett**

**With Claude Bouffard, Mark Bowker**

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## ESG Lab Reports

The goal of ESG Lab reports is to educate IT professionals about emerging technologies and products in the storage, data management and information security industries. ESG Lab reports are not meant to replace the evaluation process that should be conducted before making purchasing decisions, but rather to provide insight into these emerging technologies. Our objective is to go over some of the more valuable feature/functions of products, show how they can be used to solve real customer problems and identify any areas needing improvement. ESG Lab's expert third-party perspective is based on our own hands-on testing as well as on interviews with customers who use these products in production environments. This ESG Lab report was sponsored by Virtual Iron.

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# Introduction

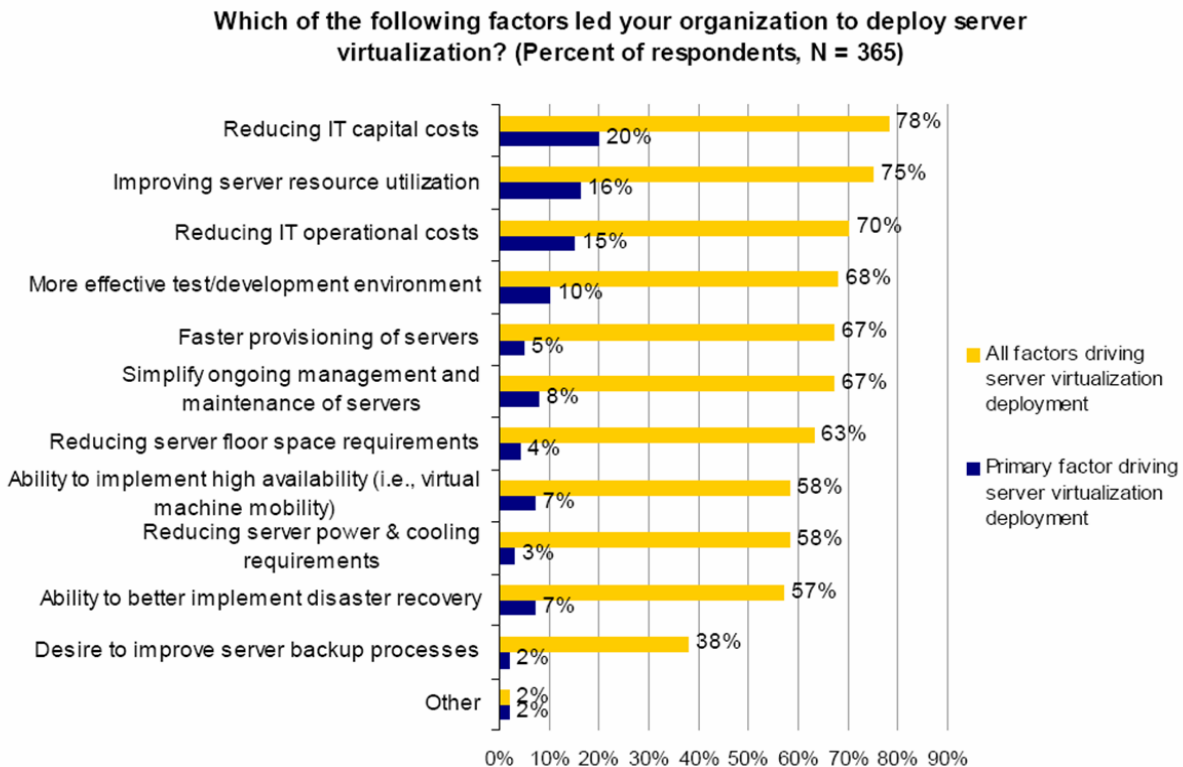
ESG has witnessed the rapid growth of server virtualization in companies of all sizes, industries and regions of the world. Clearly, the value of server virtualization is apparent as it drives down the physical costs of servers, drastically improves server management and reduces system footprint—regaining precious data center floor space while decreasing power and cooling consumption. Server virtualization software from Virtual Iron delivers on the value of IT consolidation and server management that over 1,500 users have embraced for their mission-critical, business-critical and test/development environments.

## Background

The current adoption rate of server virtualization solutions is nothing short of phenomenal. ESG research<sup>1</sup> recently discovered that of the respondents that have implemented server virtualization, 81% are using it in a production environment and 46% consider themselves to be running “Tier 1” applications. A growing number of organizations are refreshing their data centers with server virtualization being a primary motivator.

What’s driving companies to implement server virtualization? Reducing IT capital costs, reducing IT operational costs and increasing server resource utilization are the top three reasons reported by early adopters, as shown in Figure 1.

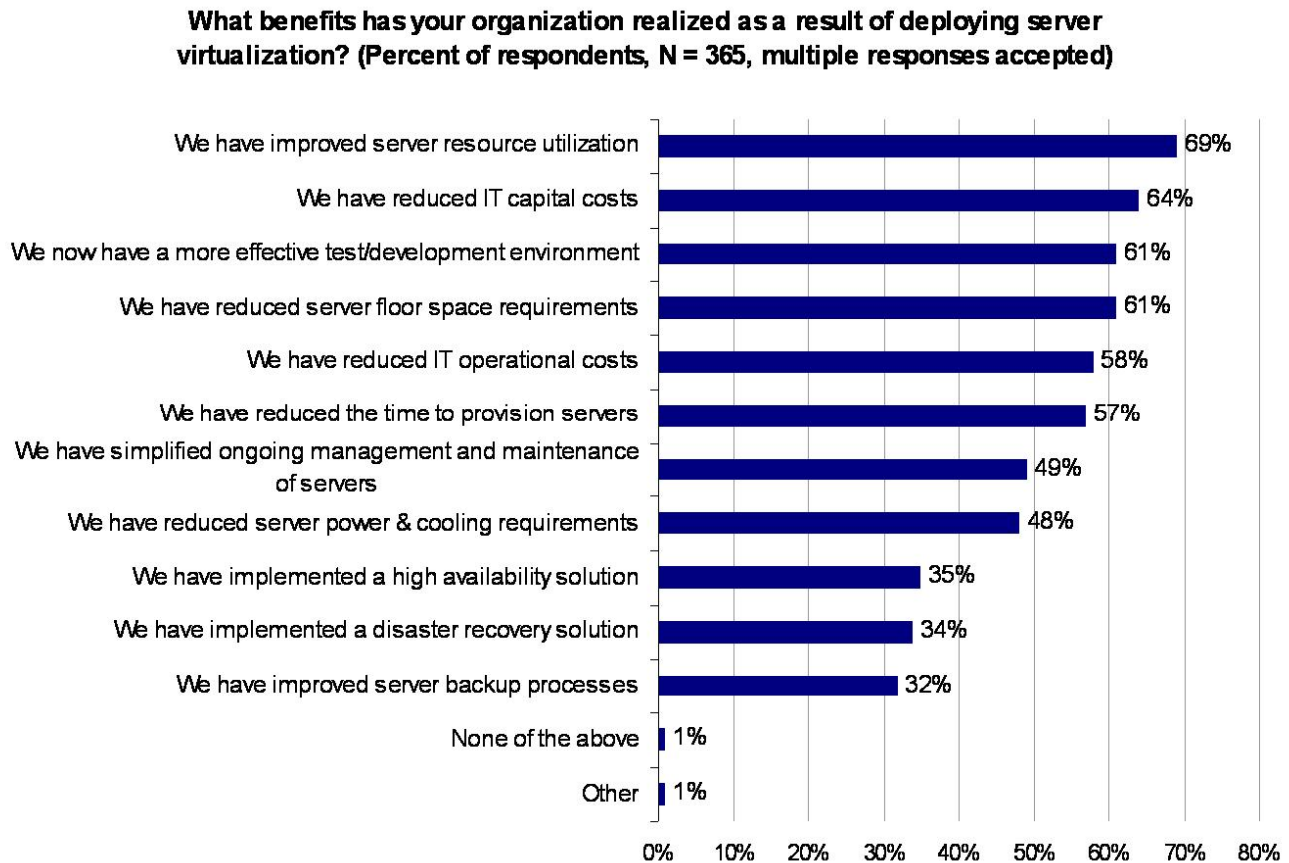
**FIGURE 1. WHY EARLY ADOPTERS CHOSE SERVER VIRTUALIZATION**



<sup>1</sup> ESG Research: *The Impact of Server Virtualization on Storage*, December 2007

ESG research found that a number of major benefits can be derived from implementing server virtualization—driving rapid adoption. As shown in Figure 2, server consolidation leads to greater resource utilization, reduces capital costs, reduces floor space requirements, accelerates server provisioning and provides a number of other benefits that have a real and quantifiable impact on IT environments, which translates into greater value to businesses.

**FIGURE 2. EARLY ADOPTERS SERVER VIRTUALIZATION BENEFITS**



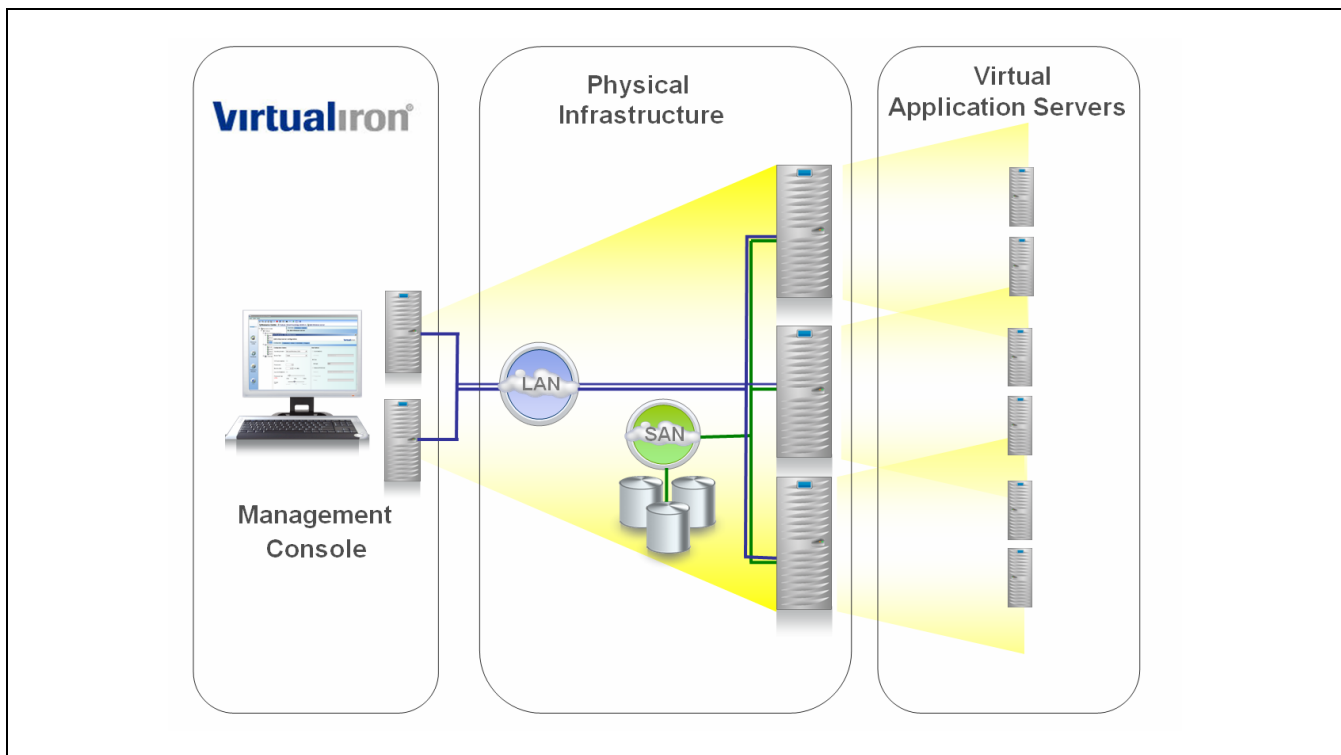
Server virtualization is high priority for a growing number of organizations because it provides clear and valuable benefits. As organizations formulate their server virtualization strategy, it is important that IT managers have different products and vendors to choose from. ESG Lab performed hands-on testing of the Virtual Iron server virtualization solution with a focus on virtual server provisioning, centralized management and policy-driven services working within a networked storage infrastructure.

## Virtual Iron

Virtual Iron is a server virtualization vendor with thousands of implementations in production environments. Its software is available through reseller agreements from major systems partners and a rapidly growing network of value-added resellers.

Virtual Iron's server virtualization solution delivers distinctive features that enable companies to quickly build, manage and protect virtual application servers in production and test/development environments. Its easy to use provisioning model allows customers to rapidly deploy and scale their virtualization environments by leveraging existing infrastructure investments. Virtual Iron's integration with Fibre Channel and iSCSI storage architectures allow it to maintain the full set of features and functionality offered by field-proven storage systems including snapshots, thin provisioning and backup. Additionally, Virtual Iron supports advanced networked storage capabilities such as remote replication and multi-path failover.

**FIGURE 2. VIRTUAL IRON**



Virtual Iron software runs in two places in the data center:

- A centralized Web-based management console provides network-based deployment and management of virtualization services. After a one-time, wizard-driven install, virtualization software services can be deployed and configured throughout the data center over the network.
- Each physical server to be virtualized runs virtualization services software from Virtual Iron. Virtual Iron's Xen-based open source hypervisor is deployed automatically by the management server to industry-standard servers and supports a wide variety of virtualized 32 and 64 bit operating systems, including the most popular variants of Windows and Linux.

This ESG Lab report explores a number of valuable capabilities provided by Virtual Iron software running throughout a data center and managed from a centralized management console:

- *LiveProvisioning* provides easy installation and administration
- *LiveMigrate* provides drag and drop migration of virtual machines between physical servers without downtime
- *LiveMaintenance* simplifies upgrades/repairs as it moves running virtual machines to another physical server without impacting workload availability
- *LiveRecovery* automates virtual machine restart after a server failure
- *LiveCapacity* load balances virtual machines by detecting and avoiding physical server CPU overload
- *LiveSnapshot* supports integrated hot backup and patch management

## ESG Lab Validation

ESG Lab performed hands-on evaluation and testing of Virtual Iron's software for server virtualization and virtual infrastructure management at Virtual Iron's headquarters in Lowell, MA. Testing was focused on user experience including ease of deployment, management, mobility, availability and compatibility with industry standard infrastructure.

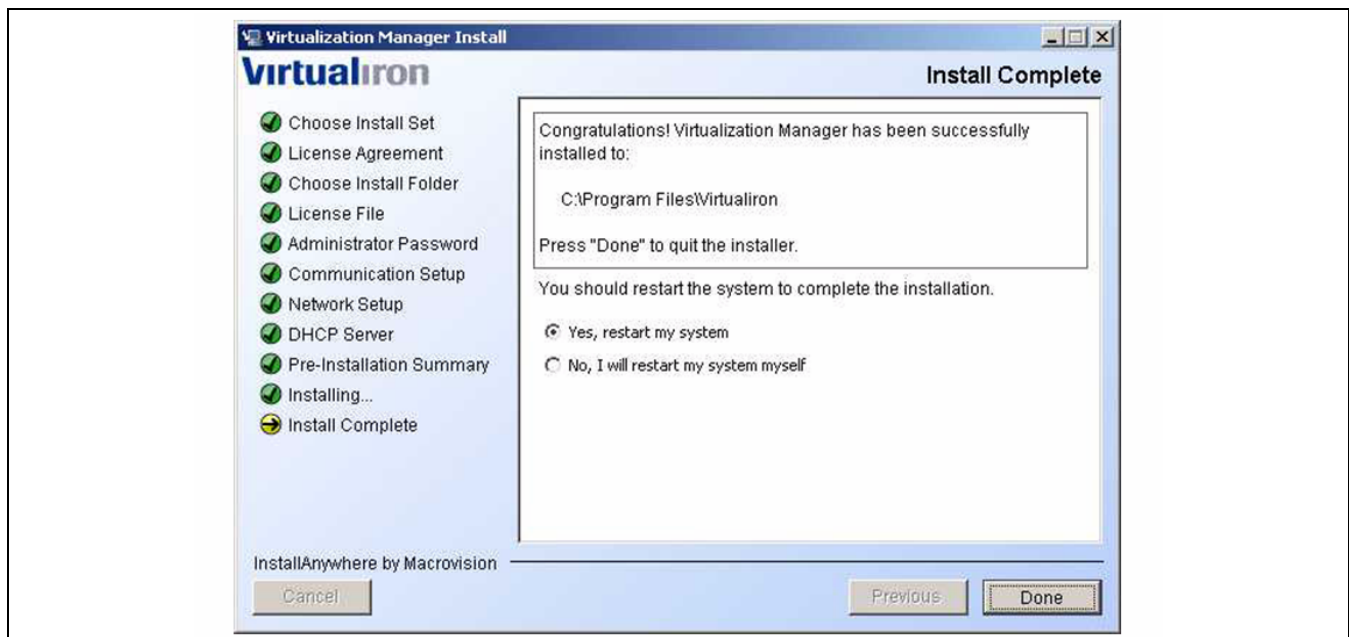
### Zero Touch Deployment

The Virtual Iron Virtualization Manager is a web-based management application that provides a centralized platform for the deployment and management of virtual machines. Virtual Iron virtualization software runs on each of the physical servers to be virtualized. "Zero touch" deployment of physical servers is performed over the network using an industry standard pre-boot execution environment (PXE) approach.

#### ESG Lab Testing

ESG Lab testing began with a wizard-based installation of the Virtualization Manager on a server with a dual-core 64 bit processor. Using a distribution CD and a wizard-driven installation process that felt like a standard Microsoft application installation, installation was completed in an impressive six minutes. The freshly installed Virtualization Manager was then launched to begin preparing a physical server for virtualization.

**FIGURE 3. VIRTUALIZATION MANAGER INSTALLATION WIZARD**

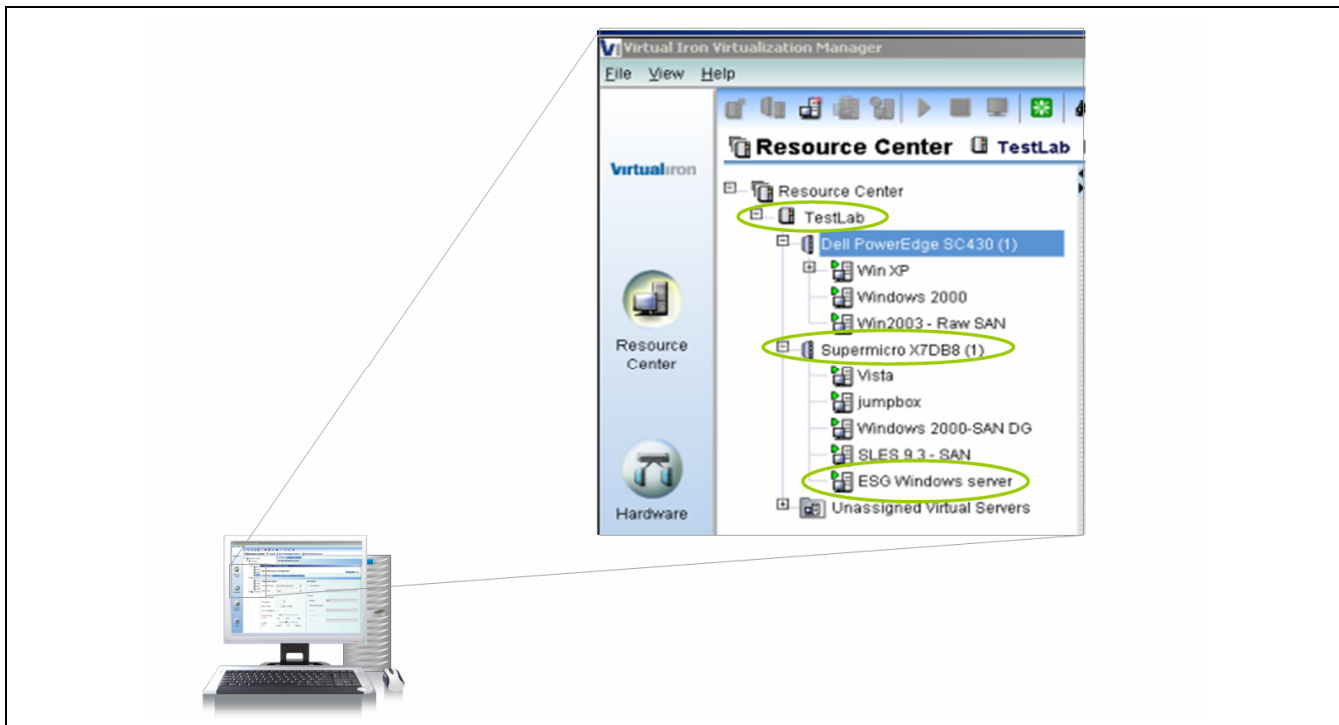


## Virtualization for Server Consolidation and Advanced Management

The BIOS settings on the new physical server were configured for PXE boot and the server was powered on. Two minutes later, the Virtualization Manager console had recognized the new server. ESG Lab noted that once the Virtualization Manager installation was complete, no CDs were needed to install software on physical servers. No Linux or command line options were required. All configuration actions were performed through either the graphical installation wizard or the Virtualization Manager.

The Virtualization Manager interface is organized in a hierarchical tree structure to support a potentially large number of physical and virtual machines. ESG Lab began working with the management console by creating a virtual data center (Test Lab), assigning managed nodes to the data center (Dell PowerEdge and SuperMicro) and then creating virtual machines (e.g., ESG Windows server), as shown in Figure 4.

**FIGURE 4. MANAGEMENT CONSOLE**



Six minutes after basic network and storage network configuration had been completed, the first virtual machine was configured and installing an operating system. ESG Lab found that “zero touch” installation on a bare-metal, industry-standard server was straightforward and easy.

### Why This Matters

IT departments have too many projects and priorities to waste time on heavy touch installation processes—accelerating deployment has a domino effect on efficiency that is beneficial to the demands of any business. One of the key values of Virtual Iron’s solution is a simplified deployment process with nothing to install on the physical servers to be virtualized—eliminating internal storage requirements for each of the physical servers. The virtualization software is automatically deployed over the network from a centralized Virtualization Manager. Whether you are implementing server virtualization on three servers or three hundred, quick and easy deployment saves time and money. ESG was impressed by the Virtual Iron installation process and feels that it provides real value to end-users.

## **Complementing the IT Infrastructure Ecosystem**

Virtual Iron complements existing IT infrastructure as it enables server virtualization and improves server management. A shared storage system connected to physical servers through a storage area network can be used to improve the availability and resiliency of a server virtualization solution. As this report will cover, Virtual Iron provides a number of advanced capabilities for migrating, managing, protecting and optimizing server virtualization environments leveraging networked storage.

Users can further leverage the built in features and functionality of a networked storage solution to make copies, replicate and backup virtual machines for improved business continuance and disaster recovery. With networked storage, multiple copies of virtual machines can be created, stored and replicated to quickly recover from a server failure. A shared pool of networked storage can also be used to improve capacity utilization, speed the deployment of new applications and reduce cost.

ESG Research found that networked storage goes hand in hand with server virtualization.<sup>2</sup> Eighty-six percent of organizations have deployed networked storage technologies to support an existing virtual machine environment and 79% of those who plan on implementing virtualization adopters indicate that they will use networked storage.

Virtual Iron's solution is designed to integrate transparently with existing IT infrastructure. Its flexible storage infrastructure options include a choice between physical or virtual storage access methods. Physical storage access methods (a.k.a. raw) are used to create a one-to-one relationship between a physical drive and a virtualized application. Virtual access methods managed within the Virtual Iron hypervisor layer provide an optional layer of abstraction for quicker test and development as well as increased availability. The Virtual Iron approach to server virtualization complements the maturity, reliability and advanced protection capabilities of industry standard infrastructure including networked storage, operating systems and file system solutions from market leading vendors.

While some server virtualization vendors recommend clustered file systems as a way to manage shared storage, clustered file systems introduce new levels of abstraction and logical storage mapping that affect storage management applications such as thin provisioning, snapshots and replication. Virtual Iron solutions enable IT users to take advantage of all the advanced use cases that server virtualization solutions promise such as policy-driven high availability, disaster recovery and dynamic workload balancing—without sacrificing the investments made in storage management solutions and best practices.

### ***ESG Lab Testing***

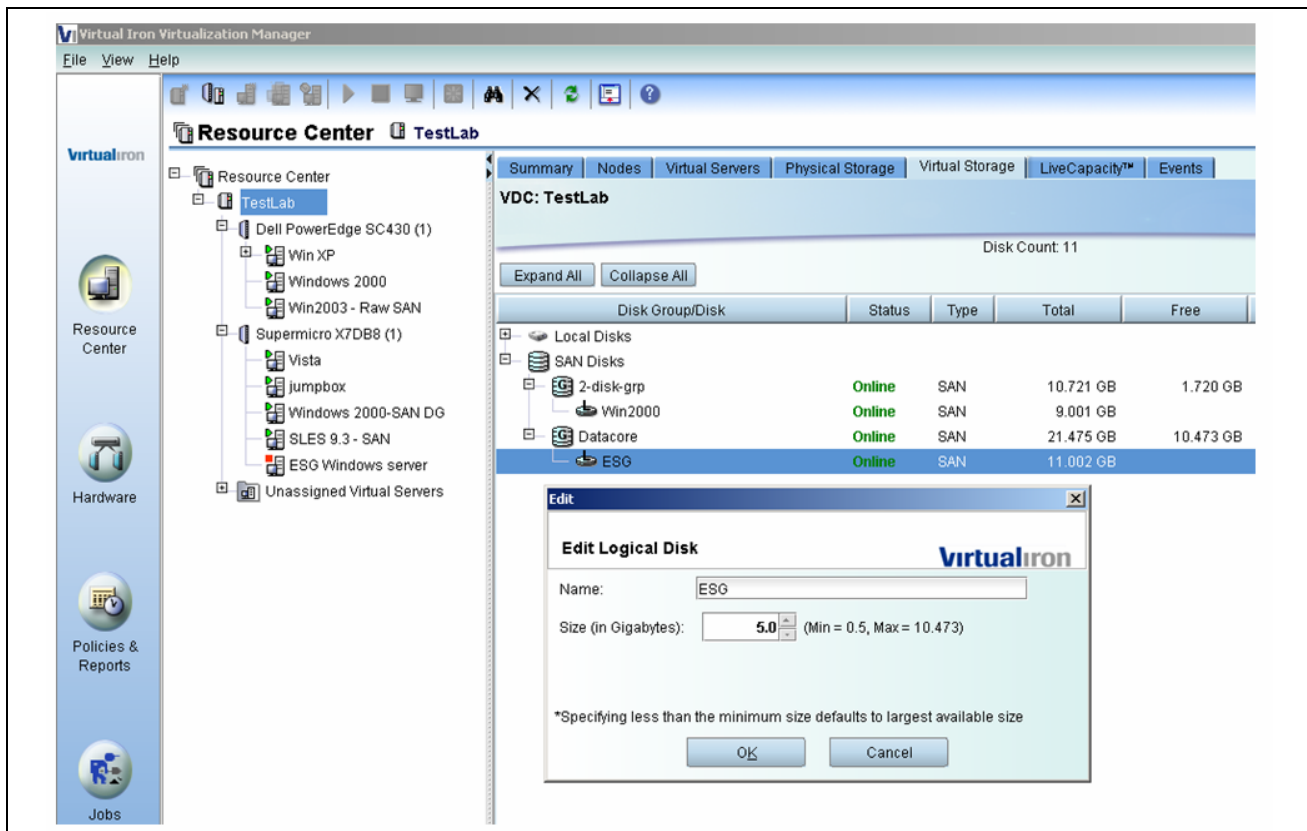
Configuring a virtual machine to use industry standard networked storage from within the web-based Virtual Manager console was straightforward and intuitive. As an example, the screen shot in Figure 6 shows a logical disk being created using shared disk capacity residing within a FC attached SAN solution. ESG Lab confirmed that a number of advanced networked storage capabilities can be used with Virtual Iron including snapshots, remote replication and multi-path failover.

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<sup>2</sup> ESG Research: *The Impact of Server Virtualization on Storage*, December 2007



**FIGURE 6. PROVISIONING NETWORKED STORAGE**



## Why This Matters

Achieving the full benefits of server virtualization requires networked storage. With more applications residing on a single server, administrators relying on local hard drives within a virtualized machine are putting themselves at risk. ESG Lab has confirmed that Virtual Iron's use of networked storage delivers enhanced reliability, flexibility and mobility. Leveraging the maturity of existing SAN solutions, file systems and operating systems, Virtual Iron is designed to complement existing infrastructure.

It is important to design network storage and server virtualization carefully to avoid creating an additional island of management. Virtual Iron's support for both virtual and physical storage access make it easy to support whichever framework works best for your environment. This is critically important since customers have made substantial investments in their existing storage solutions—enabling the use of these capabilities with server virtualization solutions should be a priority consideration. ESG Lab confirmed that a number of advanced networked storage capabilities can be used with Virtual Iron including snapshots, remote replication and multi-path failover.

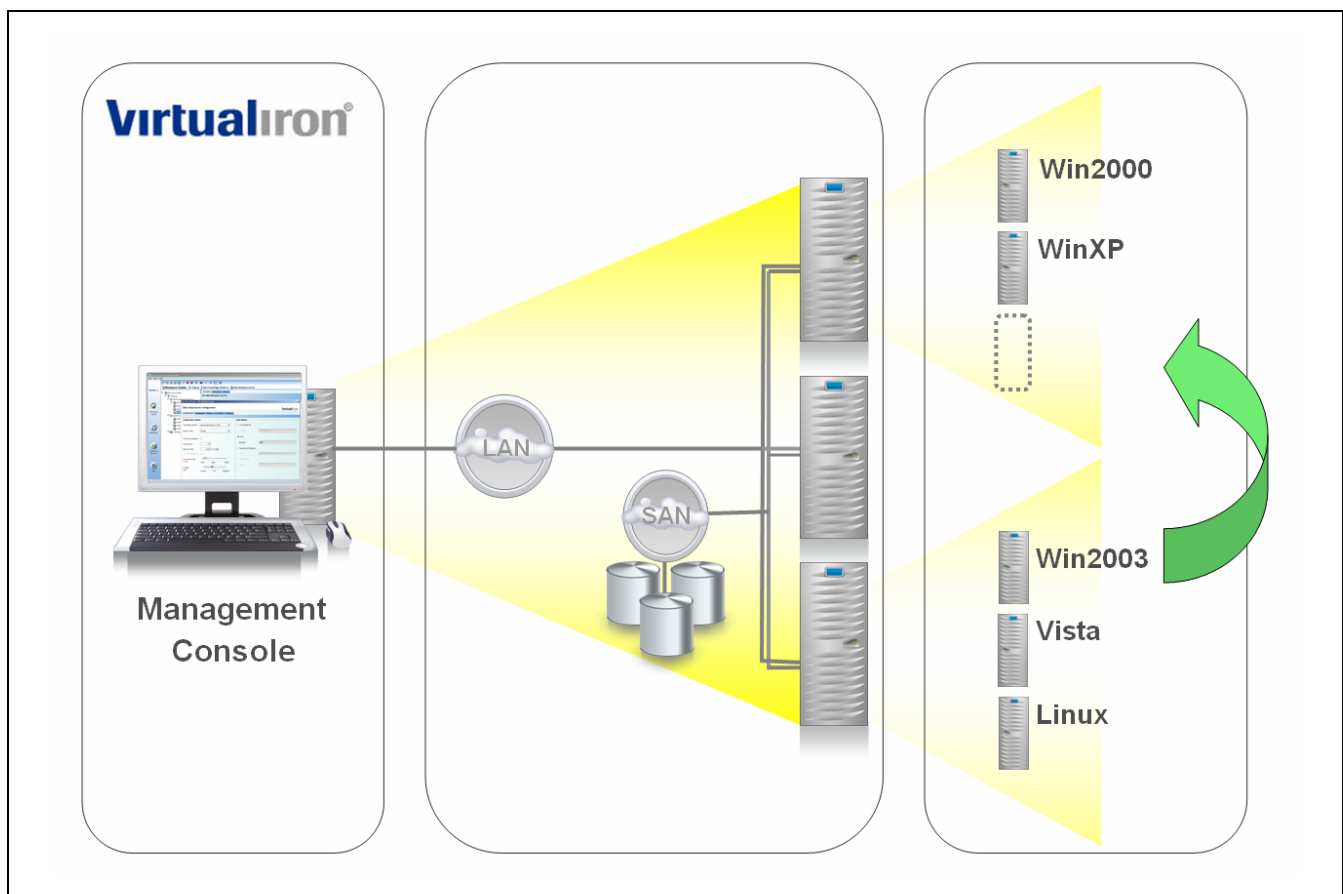
## Policy Driven Management

The Virtual Iron solution delivers a number of mobility and availability features including LiveMigrate, LiveMaintenance, LiveCapacity and LiveRecovery. These, and other capabilities, provide policy-based management and automation of virtual and physical resources. These features drive the value of Virtual Iron beyond just server consolidation to include greater mobility, management and availability of the virtualized machine environment.

### LiveMigrate

LiveMigrate is used to manually move an entire virtual machine—consisting of an operating system, applications and data—running on one physical server to another physical server without any interruption. This maintains quality of service for end-users during migrations.

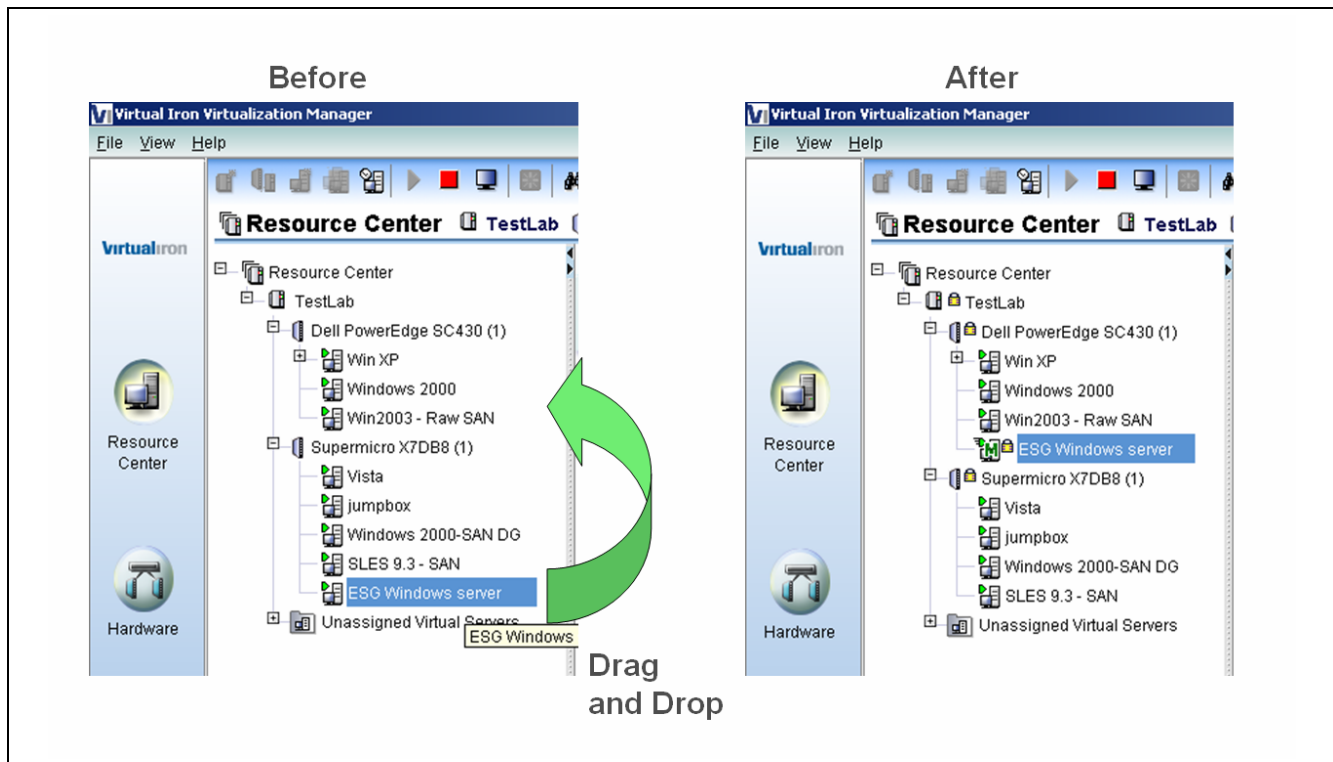
**FIGURE 7. LIVE MIGRATION OVERVIEW**



### ESG Lab Testing

ESG Lab used the LiveMigrate feature to move a running application from one physical server to another as shown in Figure 7. The virtual *ESG Windows* server was moved from the *Supermicro X7DB8* to the *Dell PowerEdge SC430* server, as shown in Figure 8.

**FIGURE 8. LIVE MIGRATION IN ACTION**



The Virtualization Manager console confirmed that the migration completed in 15 seconds. Though migration times vary based on memory size and activity, there is no downtime while the virtual machine is migrating. A ping command was used to confirm that applications remained up and available throughout the migration.

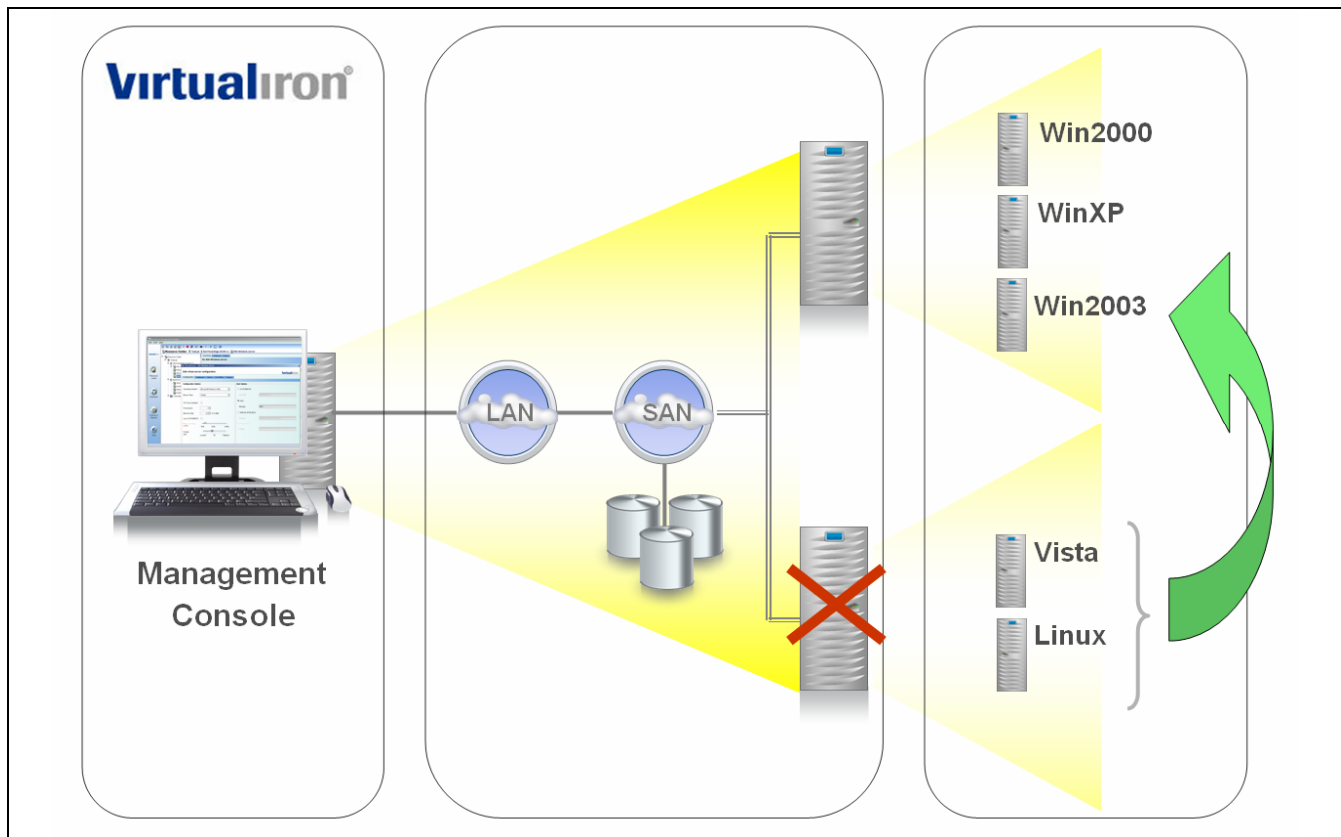
## Why This Matters

Moving applications between servers provides a number of important benefits and is essential for the management of server virtualization environments. Virtual machine mobility is one of the key capabilities that add core value to server virtualization environments—providing the ability to upgrade servers, bring new applications online quickly, and enable automated failover and performance load balancing. ESG Lab validated that moving a running application from one physical server to another is quick, easy and transparent using the Virtual Iron LiveMigrate utility.

## LiveMaintenance

LiveMaintenance is another Virtual Iron mobility feature that migrates all of the virtual machines from one physical server to another. This differs from LiveMigrate, which enables system administrators to select one or more individual virtual machines to migrate. LiveMaintenance simplifies physical server hardware upgrades, firmware updates, routine maintenance and repairs as it moves running applications between servers in a shared pool of resources based on administrative intervention.

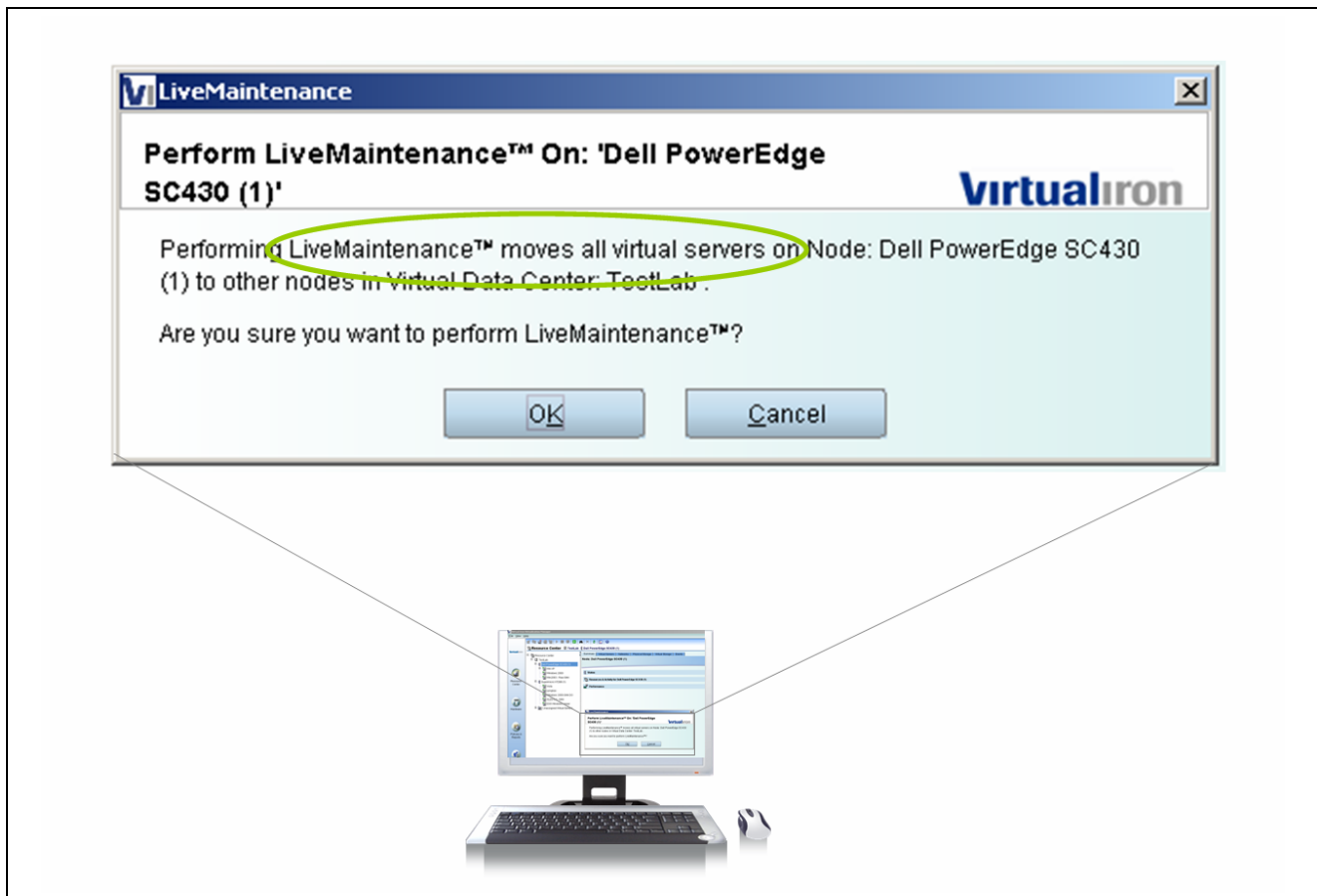
**FIGURE 9. LIVEMAINTENANCE OVERVIEW**



### ESG Lab Testing

ESG Lab tested LiveMaintenance by simulating planned maintenance on a Dell server. The “Perform LiveMaintenance” wizard, as shown in Figure 10, was used to move virtual machines running the Microsoft Vista and SUSE Linux operating systems to other servers in the Virtual Iron Data Center.

**FIGURE 10.** LIVEMAINTENANCE IN ACTION



ESG confirmed that all of the virtual machines on the Dell physical server had migrated to another server in the Virtual Data Center. All of the applications deployed on virtual machines continued to operate without interruption during the planned move.

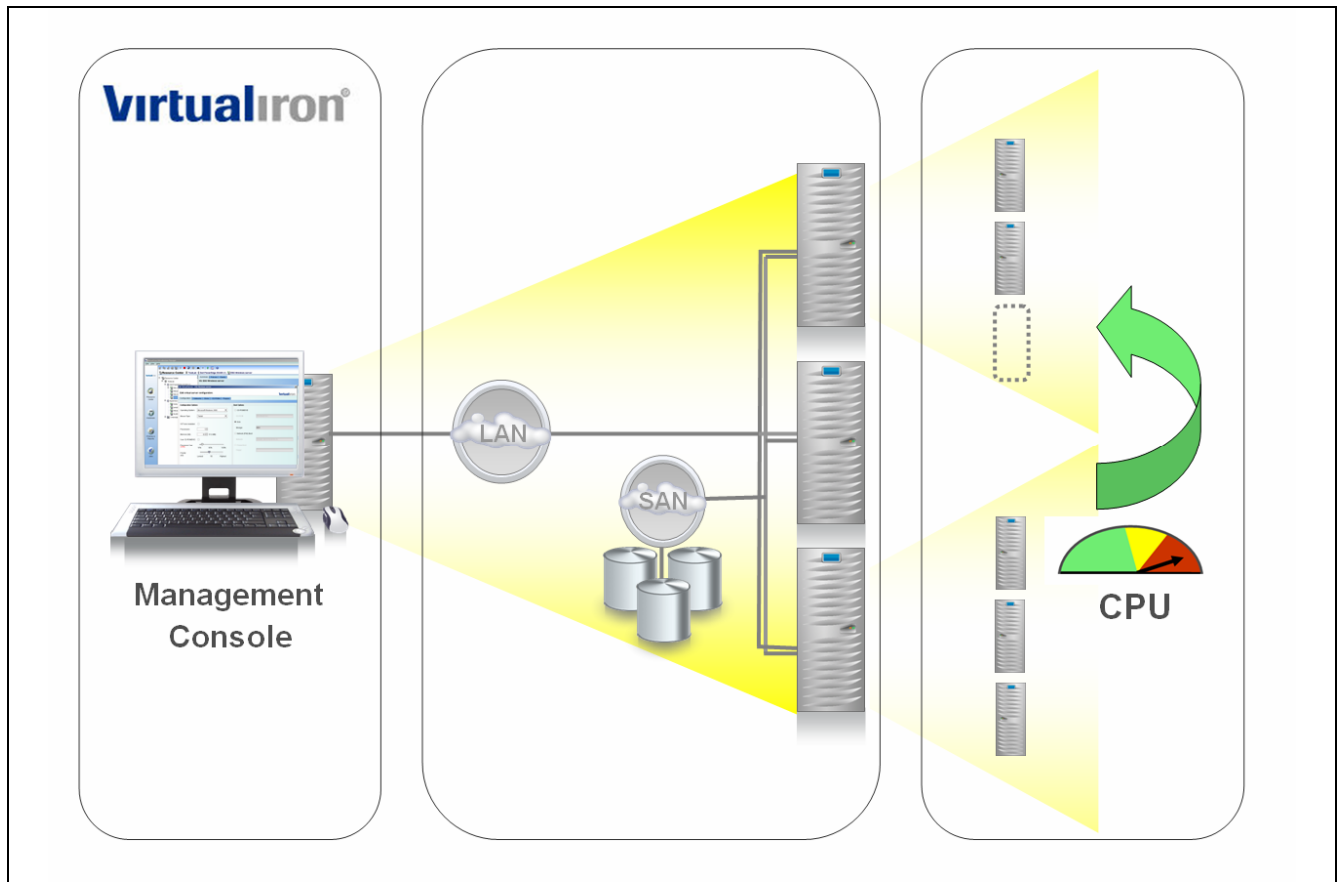
## Why This Matters

There are a number of reasons why servers are routinely taken down in the data center—including maintenance, moves, lease refreshes and upgrades. LiveMaintenance is a Virtual Iron mobility feature that allows you to move *all* of the virtual machines from one physical server to another (compared to LiveMigration, which moves individual virtual machines). LiveMaintenance enables IT managers to perform maintenance during normal operating hours while eliminating application downtime during planned server outages for all of their virtual machines running on physical servers en masse. ESG Lab used LiveMaintenance to move multiple online virtual machines running applications from one physical server to another. The process was easy to perform and intuitive.

## LiveCapacity

LiveCapacity provides policy-based automation, which detects and avoids virtual machine CPU overloads by optimizing virtual machine use across a shared pool of hardware resources. Running applications are automatically migrated to a new physical server in a Virtual Data Center when they exceed a specified CPU threshold for a fixed period of time.

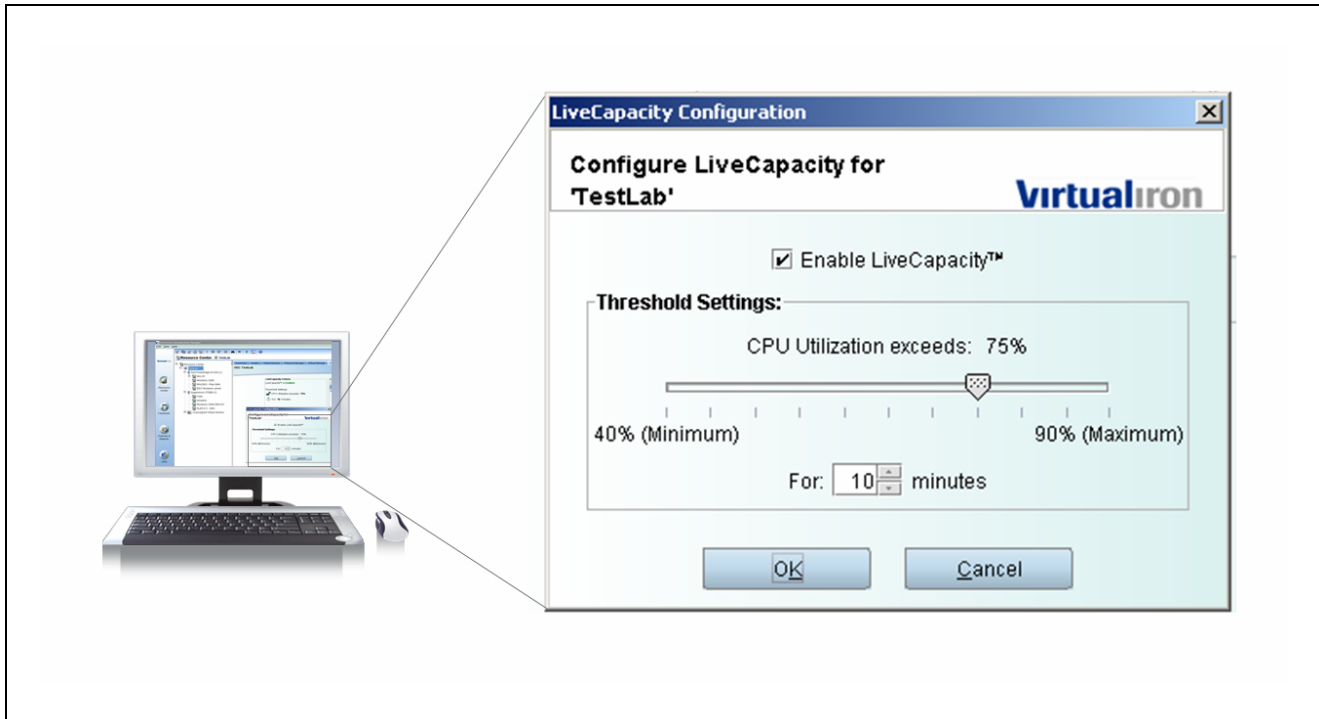
**FIGURE 11. LIVECAPACITY**



### ESG Lab Testing

ESG Lab tested LiveCapacity by first enabling the LiveCapacity feature on a physical server and then defining the policy for automated migration. As shown in Figure 12, the policy used during ESG Lab testing indicates that virtual machines should be migrated if CPU utilization exceeds 75% for 10 minutes.

**FIGURE 12. CONFIGURING LIVECAPACITY**



A CPU intensive application was started on a number of virtual machines. A Virtualization Manager graph, which displays CPU utilization over time, was used to confirm that CPU utilization was pegged at 100% as expected. Eleven minutes later, the Virtual Iron console was used to confirm that virtual machines had been re-distributed across the pool of hardware resources automatically. A continuous ping command was used to verify that virtual machines remained available as CPU capacity was automatically re-balanced.

## Why This Matters

One of the main objectives for implementing server virtualization is to have multiple applications sharing the same set of physical resources. Since these applications are now contending for physical resources, there is a chance for negative performance impact. The Virtual Iron LiveCapacity feature enables the system administrator to monitor and load balance application workloads to ensure optimal performance within the boundaries of the physical infrastructure. Keep in mind that IT environments are dynamic and that conditions and demand will change over time. That is why it is important to have policy-driven tools to enforce best practices.

ESG Lab validated that LiveCapacity automatically load balances by moving virtual machines to another physical server after any physical server exceeds a specified CPU threshold for a fixed period of time. Again, like other Virtual Iron tools, we found LiveCapacity to be easy and intuitive to implement.

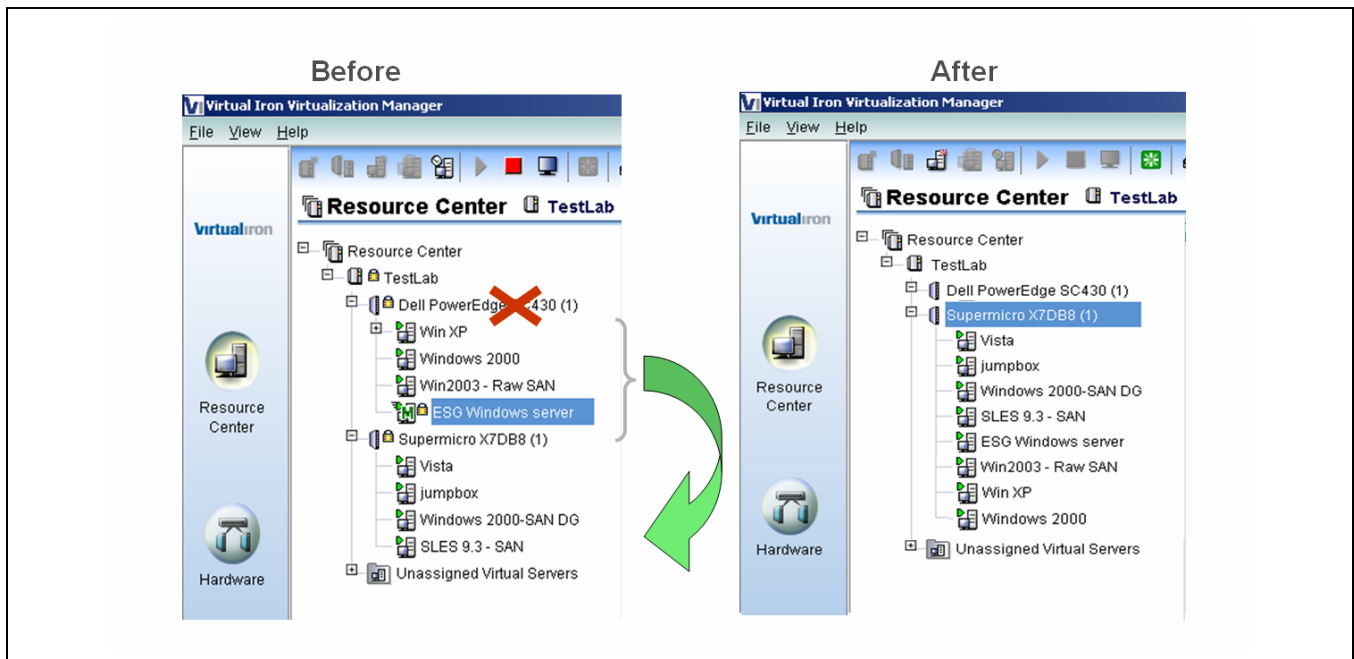
## LiveRecovery

LiveRecovery automates the virtual machine restart after a physical server failure by providing high availability and automatic migration to an online server. LiveRecovery enables the system administrator to set policies to bring virtual machines and their corresponding applications back online quickly if a physical server fails. Naturally, Virtual Iron will work with other high availability technologies such as clustering, but felt the need to provide its own high availability capability that was easy and integrated into its core product.

### ESG Lab Testing

ESG Lab validated LiveRecovery by introducing a power failure on a physical server running three virtual machines (Windows XP, Windows 2000 and Windows 2003). The three virtual machines were automatically restarted on another physical server, as shown in Figure 13.

**FIGURE 13. LIVERECOVERY**



ESG Lab found that LiveRecovery automatically restarted each of the virtual machines after a power failure. We were impressed to find the virtual machines were up and running one minute after the power interruption. Again, like the other Virtual Iron capabilities, LiveRecovery was easy to setup and monitor.

## Why This Matters

In the physical world, if a single server and application go down, it is certainly an issue. However, in a virtual world, the problem is far greater because multiple applications will be unavailable after a single physical server outage. Virtual Iron's LiveRecovery capability provides an effective solution for applications that can tolerate a short period of unavailability. ESG Lab confirmed that LiveRecovery can be used to automatically restart virtual machines on another physical server—in our case, it took only a minute of application unavailability. Other than the most stringent of environments—which require 100% uptime—we believe that LiveRecovery fits the need of the large majority of environments and applications.



## ESG Lab Validation Highlights

- ☑ ESG Lab completed a wizard-based installation of the Virtual Iron management console in six minutes using an intuitive installation wizard. Two minutes later, two physical servers were booting virtual services over the network. Six minutes after basic network and storage networking configuration had been completed, the first virtual machine was configured and installing an operating system. All in all, ESG Lab found that “zero touch” installation on a bare-metal, industry-standard server was impressive, straightforward and easy.
- ☑ ESG Lab confirmed that Virtual Iron works with industry-standard networked disk arrays (iSCSI and FC) to work seamlessly with proven disk array capabilities including snapshots, replication, multi-path failover and thin provisioning.
- ☑ In less than 15 seconds, ESG Lab performed a migration on a virtualized Windows server from one physical server to another with a simple drag and drop from the Virtual Iron management console using the LiveMigrate utility. A ping command confirmed that application performance was not impacted during the migration. The operation was completely transparent to the application with no interruption in service.
- ☑ LiveRecovery was used to automatically restart virtualized machines on another physical node within the hardware resource pool after a power failure was introduced. The virtual machines were up and running one minute later.
- ☑ All of the virtual machines on one physical server were migrated to another physical server using the LiveMaintenance utility. Applications deployed on virtual machines running Microsoft Vista and SUSE Linux operating systems continued without interruption.
- ☑ LiveCapacity was used to set a policy that automatically moves a virtual machine to one of the other physical servers in the hardware resource pool when the physical server sustains 75% CPU utilization for ten minutes.

## Issues to Consider

- ☑ Virtual Iron leverages performance advantages provided by the virtualization services built into the latest processors from Intel (Intel-VT) and AMD (AMD-V); however, older servers are not supported.
- ☑ While virtual machines and applications can run without the management console, it is required to make configuration changes and boot physical servers. It is therefore recommended that organizations follow Virtual Iron’s best practices for backing up and clustering the management console using industry standard software and methods

## ESG Lab's View

The value of server virtualization extends beyond consolidation as it also improves the manageability and availability of server environments. Therefore, a server virtualization solution should provide tools to move virtual machine images between different physical server platforms for load balancing, upgrades, testing and maintenance. An ideal server virtualization solution should also provide policy-based management tools for optimal performance. High availability and recoverability capabilities are needed to ensure application uptime.

While we are still in the early days of server virtualization and there is lots of room for growth, ESG has found that implementing server virtualization is one of the highest priority projects for organizations of all sizes. ESG has also found that IT managers want different choices for server virtualization products and vendors.

Virtual Iron is gaining real traction in the market with over 1,500 users and a strong list of strategic channel partners. ESG believes that a growing number of organizations are choosing Virtual Iron because of its rich feature set, cost effectiveness, ease of use and field-proven track record. ESG Lab testing of the Virtual Iron solution revealed that it was easy to install, has advanced capabilities and provides the mobility, policies and availability that customers are looking for in a server virtualization solution. Organizations are clearly looking for virtualization solutions and the biggest challenge that Virtual Iron faces is getting its name out into the marketplace. This ESG Lab hands-on analysis, coupled with the thousands of end-user implementations in the field, is validation that small and medium-sized businesses should consider Virtual Iron for their server virtualization solution.

# Appendix

## CONFIGURATION DETAILS

<b>Software</b>
Virtual Iron, Version 4.2
Windows 2000, Windows 2003, Windows XP, Vista, SUSE Linux
<b>Servers</b>
Dell PowerEdge SC430, 2.99 GHz, 3 GB RAM, QLogic QLA2400 HBA
Supermicro X7DB8, 64bit, 3.20 GHz, 8 GB RAM, Emulex LP9002 HBA
<b>Storage</b>
NetApp FAS3020 (iSCSI)
DataCore SANmelody (FC)



20 Asylum Street  
Milford, MA 01757  
Tel: 508-482-0188  
Fax: 508-482-0218

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