



WHITEPAPER

# Virtualization Success Depends on Network Automation

The Advent of Virtualization

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Organizations of all sizes are transitioning to virtualization technology at a dramatically increasing rate. Conducted between September and December 2010, Gartner's annual survey of 2,014 CIOs collectively responsible for \$160 billion in IT spending in 50 countries across 38 industries found that "Currently, 3 percent of CIOs have the majority of IT running in the cloud or on SaaS technologies, but over the next four years CIOs expect this number to increase to 43 percent."

The motivations for adopting the new technology are enticing: increased flexibility, decreased workload for internal IT departments, faster access to on-the-fly infrastructure needs, increased worker productivity, and significant capex cost reductions. Despite this worldwide trend across all industries, most organizations will fail in the conversion process to these new technologies. So what goes wrong when embracing virtualization and the cloud?

To understand the challenges and problems facing organizations with virtualization and/or private cloud initiatives, the basics must be clear. Virtualization is part of an overall trend in enterprise IT that utilizes virtual rather than actual hardware and software components, such as platforms, operating systems, storage devices, and network resources. Private clouds are the answer to the security risks inherent in the now familiar public clouds, which are simply varieties of hosted infrastructure. Like public clouds, private clouds provide on-demand IT services and scalability through the use of virtual machines (VMs) without physical possession of the infrastructure. But unlike public clouds, private clouds are controlled by the organizations that use them, and thereby entail reduced risks by keeping the enterprise's private cloud behind its firewall. The case for virtualization and private clouds can be made by any organization with data too sensitive to be trusted to a public cloud environment, including organizations in such sectors as healthcare, finance, retail, and insurance.

## Complexity Is the Main Challenge of Virtualization

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When looked at in the long term, the benefits of virtualization and private cloud technology go beyond cost savings, increased productivity, and greater flexibility. Virtualization and server consolidation are seen as answers to the ever-increasing complexity of modern networks. However, the dynamic nature of virtual and private cloud environments — in which servers can be split, moved, replaced, reassigned, and more, with just a click of a button — cannot be accommodated by an underlying infrastructure that is a static, physical assembly of routers, switches, servers, and firewalls. The challenge for the network infrastructure is to become as dynamic as the complex virtual world it is being asked to support.

With the rapid rise of virtual machines, connectivity once measured in the thousands has now soared to the millions and will likely expand into billions, even for smaller enterprises. A recent report from Yankee Group cites the number of IP addresses per individual user to be an astounding four or more. The report also notes a 4% penetration of the iPad as a typical end user device in a matter of months. Along with the proliferation of smart phones and other mobile devices, this ever-evolving growth in connectivity has made virtual machines an unprecedented techno-catalyst as networks and the IT staff who manage them scramble to keep pace.

The direct result of this growth is monumental change at an unforeseen pace due to the dynamic nature of the environment, the increasing rate of configuration, the expansion of virtual networks, and considerably more mission critical network traffic. Moving more data relates directly to increased business risk and cost. The advent of virtualization and cloud computing has intensified this growth rate and its concomitant complexity — ironically, while promising to help deal with it.

Complexity brings four primary dangers and complications to the network environment:

- More frequent re-configurations cause the network to become unstable.
- Existing static infrastructure cannot adapt to the dynamic demands of virtual machines fast enough.
- Manual task responsibilities overwhelm network staff.
- And, lastly, business continuity and disaster recovery risks rise significantly.

The solutions to all four problems predicated by virtualization and cloud computing are automation and control mechanisms built into the infrastructure.

## Automation is the Solution to Virtualization Challenges

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Business agility now demands dynamic infrastructure, and that is driving the need for virtualization and cloud computing, which in turn are driving the need for pervasive automation. Innovative automation technology enables customers to embrace the complexity of virtualization and cloud computing, and to harness the dynamic nature of today's workloads cost-effectively. As virtualization technology and cloud computing rebuild the mainframe in twenty-first century terms, a real-time infrastructure management problem in the core of the network is emerging. Network automation is the way to handle the problem.

Here are some direct and tangible benefits that automation brings to controlling and managing today's complex networks, including those rich in virtualization:

- Automation improves worker productivity and uptime while reducing security and failure risks.
- Automation allows customers to scale for complexity and, simultaneously, decrease costs.
- Automation transforms current infrastructure to cloud-ready and unlocks additional value in existing systems.
- Automation enables IT monetization.

Real-time visualization and provisioning are needed to deal with the new “sprawl” created by virtual machine lifecycle management. Pervasive connectivity feeds end-point growth, and requires real-time change management. Automation technology is key to visualizing and provisioning today's complex networks, especially ones that rely heavily on virtual machines, routers, switches, and rapidly changing IP addresses.

Areas such as IP address management and network control and configuration management offer prime examples of the efficacies that automation brings to today's complex networks. Automation can increase productivity and uptime by replacing inconsistent spreadsheets and by taking the manual out of error-prone IP provisioning tasks and by delegating and automating them instead. Automation delivers robust and secure DNS infrastructure and enhanced DHCP failover.

In short, automation of essential tasks — such as DNS, DHCP, IP address management, and network change and configuration management — allows a network to become more dynamic and to do more with less. Automation at this level lets IT staff troubleshoot faster, eliminates configuration errors, and enhances security and compliance. An added benefit is that network automation also helps organizations prepare for DNSSEC and IPv6, permitting enterprises to implement these new technologies without the cost of additional staff.

Automation software that can help with these challenges typically address and solve a wide range of issues presented by virtualization and private clouds. Managing the explosion of IP addresses, both physical and virtual, and addressing the compounding needs of IT staff brought on by the challenges of increased complexity — such as controlling access to network change, updating network infrastructure resources as needed in real-time, reallocating resources dynamically according to business service requirements as they arise, etc. — are how automation software leads to successful adoption of virtualization technology.

## Who Are the Likely Early Adopters of Virtualization?

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In the fall of 2010, Gartner cited a 50% increase in virtual machine penetration over the past year, and projected that nearly 30% of all workloads running on x86 architecture servers were now running on virtual machines. Who, then, is virtualization best suited for? In short, pretty much everyone who is looking to save money on IT.

In particular, virtualization technology can be of significant benefit to companies with large hosted applications, such as those in the financial, retail, travel, and telecom sectors. Other likely adopters are organizations with a heavy reliance on e-commerce and those that depend heavily on data mining or algorithm-intensive computing, such as those in the insurance, medical research, energy, and manufacturing sectors.

While an organization may see the many benefits of virtualization as compelling reasons to adopt the new technology, its current and recent outlay of capex for its existing infrastructure may appear to be an insurmountable obstacle to making the move. Ripping and replacing may be cost-prohibitive, and the disruption to business operations may be impossible to sustain. How can an organization justify another major round of technology upgrades in so short a time? In many cases, capex cannot keep up with the rapid pace of technological advances, such as virtualization, no matter how promising the long-term benefits.

Automation technologies are the solution to maintaining legacy systems while permitting migration to virtualization. Automation allows the incorporation of virtualization technology and private cloud computing into existing networks, making them more scalable, cost-effective, and safe.

If virtualization and private clouds are much akin to bringing back “mainframe-like thinking” by having business units share central infrastructure, automation is the way to keep all those business units getting what they want without overloading the central infrastructure.

## Are You Ready for Virtualization?

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Since automation is the key to virtualization success, organizations that have already adopted the technology — and those that are considering incorporating it — should examine their automation index in four primary areas: health and stability, efficiency and user-error avoidance, security and compliance, and inventory. A series of must-haves will help you assess your automation index and, hence, your virtualization readiness:

- **Health and Stability:** Have you automated IP address management — including the management of virtual IP addresses — or are you still using spreadsheets to track the IPs? Can you automatically detect network changes and assess their impact? Can you troubleshoot and analyze the network automatically, including tracking who is changing what at any given time?
- **Efficiency and User-Error Avoidance:** Have you automated the IP assignment, end point provisioning and management? Are you able to discover virtual IP addresses and know where those virtual end points are, what they are connected to, and when they change? Do you have automated scripts for network change, configuration, and provisioning tasks, including automating your IP address management process and provisioning infrastructure IP endpoints? Can you make configuration changes on a wide number of devices automatically from a central location, and update the network per business service needs and reallocate resources, including both physical and virtual ones, on the fly?
- **Security and Compliance:** Have you automated network-wide IPAM auditing processes with reports to show internal security standing and policy compliance? Have you automated DNSSEC zone signing and key management and compliance regulation detection, including DNS cache poisoning attacks? Can you automatically audit network device configurations, both physical and virtual, against compliance requirements? And can you automatically compare gold standards to existing configuration settings and report failures?
- **Inventory:** Can you tell which IP is connected to which port across the network at any time, including virtual ones? Can you obtain a current inventory of all components on the network, both physical and virtual, and detect compliance and policy failures in real-time? Have you automated asset tracking on network devices in real-time so you can tell what is connected to the network, the vendor type, model, OS, etc.? And, importantly, can you track and manage all virtual IP addresses, routers, and switches?

If you answered no to any of these questions, your automation index and virtualization readiness are less than optimal. Your network could be more cost-efficient and safer, your workers could be more productive, your compliance and security issues could possibly stand improvement, and you could be at risk for network failures.

## Infoblox Enables Network Automation

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Infoblox delivers network “automation in a box,” and alleviates the problems caused by the need to have a more dynamic infrastructure to accommodate virtualization’s complexities. Infoblox automation performs a full 90% of the manual configuration, management, tracking and reporting tasks needed to cope with the dynamic nature of today’s data centers and applications, especially when employing virtualization.

While scaling servers with virtual machines through private clouds is a major business driver, traditional processes and technologies such as managing IP addresses and network infrastructure and the associated manual tasks cannot be scaled. Infoblox offers the most scalable solution on the market with automated IPAM integrated with automated network infrastructure management.

With the proliferation of multiple vendors in many parts of today's networks, the use of spreadsheets to track the access by various users is costly, error-prone, and staff-intensive. When users request resources in a dynamic environment, different parts of the infrastructure and system experience varying stress levels that can lead to critical demand. The single pane of glass visibility provided by Infoblox offers infrastructure transparency which IT staff can use to alter IP address pools on the fly dynamically, making routing and switching changes that clear paths proactively to get users what they need.

Simply put, Infoblox technology delivers automation and control at the infrastructure level, which allows organizations to achieve the cost-savings, scale, and self-service they are seeking from virtualization. A proven industry-leader in sites around the globe, Infoblox helps deliver the benefits virtualization promises in the world's most advanced and complex networks and data centers.

## Examples of How to Enable Virtualization Initiatives

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Infoblox solutions can help with a wide variety of virtualization challenges in ways matched by no other technology. Infoblox technology tracks virtual IP addresses and virtual switches, controls fundamental elements of IT such as who has access to network change, and dynamically updates network infrastructure resources based on business service needs and reallocates them on the fly. Infoblox users can set gold standards and best practices and have existing configurations compared against them for notification when there is a failure, both for physical and virtual machines.

Here are some specific sample challenges that Infoblox solves:

### **Business Continuity and Disaster Recovery**

- Replacing or upgrading a device — Infoblox automates the process of configuring devices, both virtual and physical, to ensure accuracy and compliance with configuration requirements, standards, and compliance regulations.
- Network topology changes — Infoblox identifies, tracks, and shows all virtual infrastructure elements and correlates virtual infrastructure with physical network in a single pane of glass view.
- Disaster, network outage, WAN link, or other catastrophic site incident — Infoblox backs up all IPs and network configurations on a near real-time basis, and restoration can take place in a matter of minutes.
- Virtual or physical infrastructure performance degradation — Using context-aware technology, Infoblox automatically analyzes the virtual and physical infrastructure to identify and resolve common problems, such as port duplex mismatches, routing loops, errors in QoS settings, firewall rules utilization, etc.

- Network problems caused by a rogue device — Infoblox technology identifies the device in real-time, identifies its location on the network and its port, and you can use the technology to take immediate action to knock it off or take other action before others are affected.

## Discovery and Audit

- Inventory analysis and audit — Infoblox tracks all network devices, configurations, ports, virtual switches, virtual and physical IP addresses, and more, and shows an up-to-date inventory of all network and system elements in near real-time.
- Virtual or physical network change — Infoblox tracks who is changing what on the network at any given time, and shows the impact of every change made, thereby addressing the number one cause of all IT problems.
- Approval process failure — Infoblox offers the ability to control who has access to network change and IP address allocations, and who needs to approve the changes, affording ways to reduce and even eliminate unapproved moves, changes, and additions.
- Tracking virtual IP addresses and virtual switches — Infoblox automatically discovers and manages all physical and virtual IP addresses as a single pool of IP addresses, and also tracks and manages virtual switches, including configurations, port settings, and health statistics.

## Virtual Provisioning

- Making the underlying infrastructure more dynamic — To ensure the infrastructure keeps up with the dynamic nature of the data center, Infoblox automates network configuration changes to deliver a more dynamic and adaptive network.
- Data center system demands are stressing the network infrastructure — Infoblox technology enables the network infrastructure to become as dynamic as the systems and services it supports, including VLAN reassignment and making changes to the network dynamically with click and drag capabilities.
- IP connectivity needs trouble-shooting — Infoblox keeps track of all IPs, both virtual and physical, allowing the user to tell which VM is running on which host, see VMs grouped by data center, by switch-port, and by VLAN — all automatically, making trouble-shooting simple.
- Establishing or provisioning a new server — The single-picture visualization of the network topography provided by Infoblox technology helps the administrator see where a new server can and cannot go, and the Infoblox server provisioning technology automates the DNS changes and IP address assignment, as well as identifying how network configurations impact the behavior of the services the server delivers.

## Compliance

- Need to establish internal gold standards and best practices — Infoblox automation provides the ability to compare gold standards and best practices templates dynamically against configuration settings, and notifies failures immediately. Industry best practices are already built into the Infoblox technology and can be modified by the user as needed.

- Need to move all management systems onto virtual servers — Since Infoblox technologies are designed to run on both physical and virtual devices, so organizations can deploy all physical, all virtual, or a combination of physical and virtual Infoblox appliances, and experience no negative impact from one deployment to another.

While the premise of virtualization is cost savings, some appliance-based management systems continue to take up physical rack space. Since all Infoblox technologies run on both physical and virtual appliances, organizations can migrate and deploy at will. The end result is that the customer can continue to lower energy consumption, reduce data center rack space, take advantage of VMware built-in disaster recovery and rapidly deploy new appliances as the need arises.

### **Infoblox Overlays Control on Virtualization Technology**

Virtual machines can be a little like strangers at a party — they are hard to keep track of and their behavior cannot be fully controlled. Since their presence makes the party better, you welcome them but you want them to fit in with the regulars. Automation is a lot like having a host and hostess who always know where every guest is and what they're doing, whether they be old friends or newcomers, and can make sure that everyone behaves properly so that a good time is had by all. Infoblox delivers the kind of control that keeps virtualization technology acting like good party guests, even those that are new arrivals.

Enabling the dynamic network is an Infoblox specialty, with visibility and automation being key to staying one step ahead of increasing complexity, an essential ability when adopting virtualization technology. Along with real-time automated DNS/DHCP and IPAM, network control and compliance make networks efficient, more available, and cost-effective, with reduced risk. All of these factors are essential to managing virtualization technology in your network and tackling the challenges associated with private clouds.

Infoblox streamlines network readiness and optimization for data centers and virtualization deployments, while assuring regulatory and corporate policy compliance. By improving efficiency for IT operations, Infoblox solutions increase staff productivity. Investment in legacy networks is protected because Infoblox automation extracts more value from existing infrastructure. Lastly, with Infoblox solutions business continuity is ensured through highly available network data and visibility, including core technology for reliable disaster recovery. All these factors help deliver the promise of virtualization.

### **Infoblox Can Help You Add Virtualization Safely**

Whether your organization has already adopted virtualization technology or is exploring ways to make the leap, let Infoblox explain how its solutions can enable your IT staff to tame the unavoidable complexity virtualization brings. Infoblox technology delivers tools that make IT staff more dynamic, insightful, productive, and gives them greater control over the network than ever before. Infoblox technology can make your virtualization adoption more cost-effective, more scalable, and more risk-averse.

Virtualization means countless components on the network are in constant flux, moving and shifting at rates beyond human control. If IT staff are limited to manual means, they cannot track virtual IP addresses or the impact of change to business service in real-time. Attempting to manage virtual elements on a network through traditional manual means is a recipe for a dangerous loss of control, and that can lead to significant disasters.

By automating network change and configuration, you put your IT professionals back in charge of IP address management, DNS/DHCP, change and compliance, end point provisioning, and all aspects of the network. By letting your staff know who is changing what at any given time, Infoblox technology gives them the component visibility that makes trouble-shooting fast and effective, including complete inventory in real-time and detection of compliance and policy failures.

Infoblox automation takes the unknown out of virtualization by putting your IT staff back in control through automated tracking and managing of all virtual IP addresses, routers, and switches. Our automation technology can reduce the workload of your IT staff, eliminate the error-prone manual tasks that can lead to disasters, and can leverage your legacy infrastructure to save you capital expenditures as you gain the benefits of virtualization technology.

Call us today to have an Infoblox specialist discuss your virtualization needs and aspirations with you in the context of your organization's particular circumstances, and let us show you how we can help you make them a reality.

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