Confidently maximize virtual investments with IBM Integrated Service Management

Use visibility, control and automation to ensure high availability, tighten security, and reduce hardware and labor costs.

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The benefits of virtualization, from accelerated service delivery and resource optimization to reduced costs for IT resources, have spurred many organizations to move toward a virtual infrastructure. However, the nature of the virtual environment, which calls for a vast network of shared resources, has created a new set of management complexities that can impede business service delivery—and has revealed an increasingly urgent need for service management.

For organizations that have migrated business-critical workloads to the virtual environment, current market offerings may provide a robust hypervisor layer, but they do not provide adequate support for managing service availability, performance, security, and quality. In addition, virtualization breeds a variety of issues stemming from a lack of visibility into business services and the components on which they reside. Consequently, what many organizations face today is an opaque infrastructure that hinders their ability to manage service performance and delivery, optimize resource usage, and isolate and resolve problems. Furthermore, lack of visibility and control hinders organizations' ability to confidently maximize their investment in virtual resources, such as VMware, by mixing different workload types in a single cluster.

Managing the virtual environment with an eye toward business services requires integrated service management capabilities within an integrated architecture. This white paper details IBM Integrated Service Management offerings for VMware and other virtual environments, focusing on key capabilities for discovery, monitoring, capacity planning, provisioning, storage, security and financial management. Designed for flexible implementations that align to an organization's business needs and

existing infrastructure, IBM's single-vendor solution for virtualization management has offerings that can work as stand-alone solutions or as fully integrated management solutions.

The need for service management in the virtual environment

While there are a number of virtualization products and management tools on the market today, many simply do not provide adequate service management capabilities, leaving organizations scrambling to realize the benefits of virtualization without compromising business services. The result is that resources that could be virtualized are not, capacity and applications are underutilized, and potential revenue opportunities, such as those provided through cloud computing, go unrealized. Unlike competitive offerings, which support only infrastructure resiliency, IBM virtualization management offerings, part of the IBM Integrated Service Management portfolio, enable organizations using VMware or other virtualization solutions to enhance the benefits of virtualization while sharpening their focus on improving business service delivery while reducing operating expense.

Understand virtualization challenges

When assessing the IT landscape, it is important to understand that virtualization carries with it some inherent challenges to business service delivery. A lack of visualization into the virtual environment impedes problem resolution and slows service performance and service delivery increases software audit risk and limits cost transparency. Lacking that insight, organizations are also unable to control business services and set consistent business policies to maintain consistency, security and compliance. Lastly, manual processes for managing the virtual environment, from discovery and provisioning to monitoring and

storage management, increase problems and open the entire infrastructure to performance-degrading errors. Consequently, organizations moving along the virtualization continuum often face a variety of unanswered questions regarding:

- Where services are running and how they have changed.
- How to proactively ensure high availability of services.
- How to plan for and ensure adequate capacity.
- How to rapidly provision resources.
- How to manage image and resource sprawl.
- The best way to secure the infrastructure and protect data.
- The costs of service delivery, and how to reduce labor expense.
- How to allocate charges for shared resources.
- How to get insight into software inventory and associated license entitlements

IBM solutions can help organizations more effectively manage business applications and services and accelerate delivery of new services, and they can do so in a way that reins in virtualization costs.

Increase visibility to understand performance

IBM solutions provide a holistic view into the virtual infrastructure to enable users to better understand performance and to diagnose and resolve performance issues.

Discover the infrastructure and application environment and how it has changed

Organizations at the beginning of the virtualization journey must start by consolidating resources, often migrating multiple applications, servers and databases from one platform to another. To accomplish this, it is essential to understand the physical and

virtual infrastructure, what should be migrated and to which platform. Many existing virtualization offerings do not provide visibility into where applications reside or their relationships to both physical and virtual resources. This creates a hazardous scenario in which taking down a virtual server, for instance, could affect a business-critical application. Organizations need the ability to see the relationships between virtual machines and how they affect business services—both to avoid service disruptions and to speed recovery when a problem occurs. IBM discovery offerings enable organizations to both understand and visualize the relationships between physical and virtual resources, to deliver information about:

- Applications and application dependencies and which virtual machines they run on.
- All the virtual machines associated with a hypervisor.
- Relationships to network and storage components in the infrastructure.

IBM discovery offerings also provide the ability to receive notification from the hypervisors on application migrations or configuration changes, enabling IT to require individual user approval before business-critical applications are moved.

Solution: IBM Tivoli® Application Dependency and Discovery Manager

Proactively detect performance problems with predictive trending

Without end-to-end visualization, pinpointing and resolving problems in the virtual environment is impossible. This is because in the shared virtual environment, problems usually occur due to the complex interaction of application servers, database servers and other share server, storage and network resources. For this reason, organizations must be able to collectively monitor applications, servers, storage and networks, while

having access to a historical performance baseline. They must be able to stay abreast of processor utilization and capacity, to understand whether a configuration change has downgraded performance, and to anticipate the best way to distribute workloads for optimal performance and energy usage—while avoiding virtual sprawl.

IBM monitoring solutions deliver a holistic view of application components across the IT infrastructure, enabling organizations to visualize application environments end-to-end, to pinpoint the location of problems—and anticipate potential problems—wherever they occur, whether between the end user and the network or within an application or database server. They can also collect metrics to uncover problems within a specific component, enabling administrators to take necessary actions before business services are disrupted. IBM monitoring tools also enable IT to monitor performance over time, understand when they are approaching thresholds and performance indicators, such as a maximum database workload, so that administrators can preventively reassign resources before the problem occurs.

IBM monitoring solutions help organizations to:

- Visualize virtual server utilization against historical trends.
- Collect key performance and availability metrics, including application, virtual machine, virtual network and virtual storage I/O.
- Set proactive and predictive alerts.
- View real-time and historical data simultaneously.
- Separate intermittent problems from recurring problems within peak workloads.
- Warehouse data and report on current and future trends to identify resource bottlenecks and plan for future capacity needs.
- Monitor across heterogeneous environments, including z/VM®, Power Systems™, VMware, KVM, Hyper-V, Solaris and Citrix.

Solutions: IBM Tivoli Monitoring, IBM Tivoli Monitoring for Virtual Servers

Effectively manage virtual storage across the infrastructure
Managing storage capacity, maintaining fast backups and restores, and controlling storage growth and related storage costs is critical to an effective virtualization management strategy—and can be just as important in maintaining high-performance service delivery. Unlike other solutions on the market today, IBM solutions provide deep storage monitoring and management capabilities, helping organizations to optimize storage usage by:

- Viewing capacity utilization by computer, virtual machine or storage system.
- Revealing file system and database storage utilization details.
- Identifying wasted space on volumes based on age, file type or any other user-defined filter.

For instance, IBM offers a storage resource management platform that provides visibility into devices and capacity, as well as storage locations, showing which virtual machines are using storage and the locations of underutilized storage, performance issues and bottlenecks.

Other IBM solutions for managing the virtual server environment enable organizations to:

- Virtualize across heterogeneous storage for more efficient use of resources, simplify storage management and provisioning, and enable nondisruptive data migration.
- Manage replication technologies to automatically move copies of data into different locations to support disaster recovery and business continuity.

- Reduce the amount of data at risk of loss to nearly zero and reduce the time to restore any amount of data to just a few minutes.
- Manage data throughout its life cycle, including data placement, migration, retention and expiration.
- Reduce the data storage footprint through efficient, block-level incremental backups and built-in data deduplication.
- Perform fast off-guest backups that conserve processor resources, while simplifying licensing and administration.
- Conduct easy-to-use laptop data protection and recovery.

IBM storage management solutions provide the flexibility to manage data and storage across physical and virtual servers in ways that are best suited to each organization's unique infrastructure and business requirements.

Solutions: IBM System Storage® SAN Volume Controller; IBM Tivoli Storage Productivity Center; IBM Tivoli Productivity Center for Replication, IBM Tivoli Storage Manager FastBack®, IBM Tivoli Storage Manager; IBM Tivoli Storage Manager FastBack for Workstations.

Minimize security threats
IBM solutions for virtual security help organizations eliminate security threats that are inherent in shared environments, enabling them to leverage:

- Authentication and role-based access control.
- Isolation management for servers, storage and networks.
- Integrity management.
- Risk and compliance tools for auditing, configuration management and regulatory compliance.
- Threat and malware management.

IBM Security Virtual Server Protection for VMware
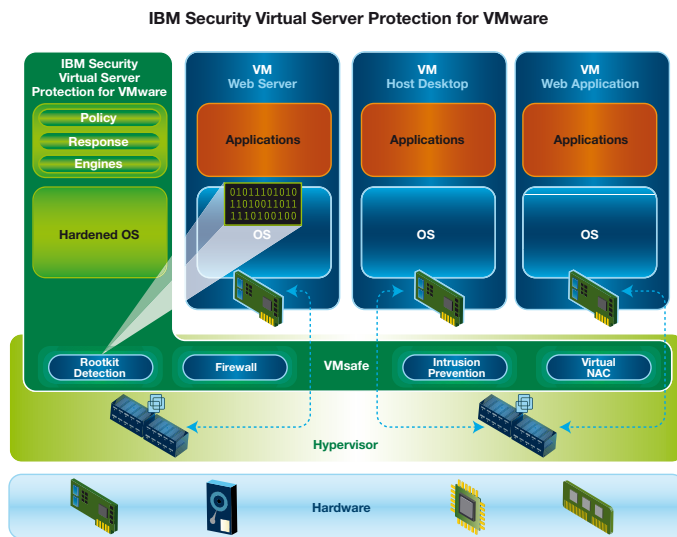
IBM Security Virtual Server Protection for VMware helps organizations operate more securely and cost-effectively by delivering integrated and optimized security capabilities for virtual data centers.

Strengthen security to keep threats and compliance violations at bay

Because of the nature of the virtual environment, in which multiple resources are shared across components and users, a breach of one physical server can potentially become a breach across a multitude of virtualized servers. In addition, virtualization enables mobility of systems and flexible deployment and redeployment of systems that is impossible to achieve with physical resources. The benefit is flexibility, but the risk is a lack of control. Whereas a pure physical environment once required administrators to manage a one-to-one ratio of operating

systems and applications per server, that ratio is now one-to-many, creating an additional layer that must be managed and secured in the infrastructure. What's more, as network and server administration begins to converge, physical security devices and other security tools become less effective, and manually tracking software stacks and configurations of virtual machines and images becomes increasingly impractical. Subsequently, virtual environments are vulnerable to hazards like virtual machine-to-virtual machine attacks, malicious hypervisors that attack hosted virtual machines, and decentralized management due to virtual sprawl. The reality is that traditional security tools are not equipped to address virtualization.

Major security and governance requirements in the virtual environment include:

- **Configuration and isolation**, understanding which configuration settings affect virtual machines and using network isolation to continuously monitor the entire infrastructure for changes resulting in data breaches.
- **Server and image lifecycle management and change control** to understand what virtual machines are being deployed, which are currently running, when they were last patched and who owns them.
- **Having well-defined identity and access management policies** that balance access to allow proper maintenance and security with restrictions to prevent access for unauthorized users.
- **Controlling virtual machine mobility**, to understand the security zones in which applications are running.

IBM provides a range of virtualization security products, services and leading-edge expertise to help organizations maintain security while realizing the benefits of virtualization. The foundational virtual security offering, IBM Security Virtual Server Protection for VMware, is an integrated threat-mitigation solution designed to help organizations fully exploit the benefits of server virtualization while protecting critical virtualized assets. It provides the same intrusion prevention capabilities of other network intrusion prevention systems (IPS), as well as integration into the hypervisor through VMware's VMsafe interface, so organizations need install only one instance for each virtualization server to protect the virtualized infrastructure. The product also provides firewall technologies for critical network-level access control specifically designed to prevent virtual server sprawl.

Other IBM virtual security offerings and features include:

- Virtual security appliances to reduce operational expenses while increasing flexibility for the security infrastructure by enabling asset reuse.
- Transparent inspection of virtual machines to detect rootkit installations.
- Automatic virtual machine discovery to increase security awareness and visibility.
- Automatic protection against virtual server vulnerabilities, regardless of patch strategy.
- Proactive web application, Web 2.0 and database protection to limit potential business interruptions and exposures.

- A central management system for controlling security policy, analysis, alerting and reporting that is supported on VMware ESX.
- Virtual infrastructure auditing that ties into regulatory compliance initiatives.
- Virtual environment awareness and transparent plug-and-play threat protection to address security concerns associated with virtual machine sprawl, lack of virtual network visibility and mobility.

It is important to note that competitive offerings typically contain a limited number of these features and may also require organizations to maintain multiple modules. IBM virtual security solutions are designed to work cohesively for easy deployment and maintenance.

Solutions: IBM Security Virtual Server Protection for VMware, IBM Security SiteProtector System, IBM Security Network Intrusion Prevention System.

Control costs

Aside from the costs of overprovisioning resources and service performance degradations, virtual environments can also present financial challenges for organizations that do not plan for capacity needs, are unprepared to effectively maintain license compliance, or cannot properly allocate costs for resource usage. IBM solutions meet each of these needs.

Plan capacity needs

To effectively manage capacity that enables high availability and maximizes resource utilization, capacity planning needs to occur at the resource and workload level. Capacity planning at the resource level includes:

- Virtual machine right-sizing—Virtual machines must be initially provisioned with allocated CPU and memory. By understanding real usage of computing resources over time, organizations can adjust the allocated computing resources to levels needed for the virtual machine. In addition, organizations can view virtual machines that are no longer active and deprovision them to free additional computing resources.
- Predicting physical and virtual resource capacity bottlenecks— Preventing performance problems related to capacity constraints requires the ability to understand actual usage, allocated capacity and available capacity for CPU, memory, network and storage resources for clusters, hosts, virtual machines, datastores, volumes, host bus adapters and network adapters
- Workload balancing—Comparing usage and available capacity across clusters and hosts to determine over- or underutilized clusters and hosts.

Capacity planning at the workload level requires:

- Determining how many more customers or transactions can be serviced with existing resources (including a specified buffer factor) in a cluster or host by using an average or peak virtual machine profile, or by inputting the size of the virtual machine(s) that are needed.
- What if analysis to determine if there is enough capacity on a host or cluster and what capacity is available for additional virtual machines.

IBM Tivoli Monitoring solutions collect key performance metrics necessary for capacity planning such as CPU, memory, storage and network utilization, warehouse this data and then reporting on capacity trends using IBM Tivoli Common Reporting. Tivoli Common Reporting provides out-of-the-box reports as well as drag-and-drop capabilities for ad-hoc reporting.

Solution: IBM Tivoli Monitoring for Virtual Servers

Automate license management

Because organizations lack the necessary visibility into virtual resources, over- and under-purchasing software licenses is a common problem in the virtual environment. Yet many employ

manual tracking procedures, even resorting to error-filled spreadsheet tracking. IBM solutions enable organizations to automate license management by helping them to:

- Identify software inventory, measure use activity link complex license entitlements, enabling IT to align software spending with business priorities.
- Minimize unnecessary license fees by identifying unused or infrequently used software inventory.
- Reduce costs to conduct internal/vendor audits
- Eliminate cost of unplanned license compliance penalties
- Monitor software use trends to plan financially optimal software migrations and license model changes.
- Prepare for contract negotiations by providing a complete view of software deployment across the enterprise.

Solution: IBM Tivoli Asset Management for IT

Fulfill revenue opportunities with usage and accounting
To fully realize the benefits of cloud computing, a model that can only be implemented via virtualization, organizations must be able to understand the cost of the resources that are used by the cloud services. This task is much more challenging when services reside on shared virtual servers. Transforming shared assets into shared services requires cost allocation capabilities.

Understanding the cost to deliver the cloud services allows cloud service providers to run a profitable business and maximize the investment in the virtualization resources. IBM usage and accounting solutions enable organizations to:

- Provide visibility of costs to determine profitability across lines of business, products and cloud services.
- Allocate costs and/or chargeback to the consumers of the cloud services or virtualization resources.
- Understand virtualization resource costs to help justify expenses and future investments.
- Align costs with business objectives.

Solution: IBM Tivoli Usage and Accounting Manager

Automate provisioning and application delivery
Provisioning services can be time consuming and, therefore, costly without the correct tools. While the time it takes to create a logical partition and to provision an operating system may be minimal, provisioning across hardware and software, networks, storage and security can easily slow application deployment cycles to multiple weeks. IBM provisioning solutions help to manage the provisioning process end-to-end, enabling organizations to automate the deployment of virtual images and application stacks to improve service delivery while decreasing the time and costs required to deliver a new application.

IBM provisioning works by capturing existing procedures, linking systems management tools and executing those, alongside new processes, in a repetitive, error-free manner—either within or across organizational boundaries. IBM provisioning enables organizations to:

- Automate best practices for data center provisioning activities in support of change and release management processes, helping to optimize efficiency, accuracy and service delivery.
- Discover and track data center resources to enable highly accurate server provisioning and software deployments.

In addition, with IBM provisioning solutions, the server-to-administrator ratio grows from 86 to more than 150 servers per administrator—a 75 percent increase—so administrators can easily manage more resources while eliminating manual provisioning processes through automation.

Solutions: IBM Tivoli Provisioning Manager, Tivoli Service Automation Manager, IBM Service Delivery Manager

Standardize service delivery

Re-provisioning services multiple times is a duplication of effort and waste of valuable IT resources. While many lines of business need access to their applications and virtual images, a lack of control and governance can lead to virtual image sprawl: and uncontrolled proliferation of images and lack of compliance. IBM provisioning solutions can help organizations manage images across the enterprise, and govern versions, provenance, and content to support reuse, helping to minimize image management time and costs.

Solutions: Tivoli Provisioning Manager, Tivoli Provisioning Manager for Images

Reinforce the virtual environment

In addition to robust solutions for monitoring, security, storage, provisioning, discovery and financial management, IBM solutions enable organizations to reinforce the virtual environment with:

- Business service management, including network, asset, and access and identity management.
- Desktop and enterprise patch management and compliance.
- Change and configuration management processes.

Summary

To achieve the full benefits of virtualization while maintaining service quality, security and performance, organizations can draw on IBM Integrated Service Management solutions to better discover, monitor, provision and secure virtual resources, including storage, and to control the costs of the virtual environment. IBM service management solutions help organizations better manage business services by delivering the visibility, control and automation needed to:

- Discover virtual assets to enhance visibility across the physical and virtual infrastructure.
- Rapidly provision virtual resources to accelerate service delivery.
- Monitor the virtual environment end-to-end to achieve peak application performance.
- Maximize the efficiency and cost-effectiveness of virtual storage.
- Enhance security across virtual assets with automated control features.
- Control the costs of service delivery in the virtual environment.

For more information

For more information about how IBM Integrated Service Management can help you achieve the full benefits of virtualization while enhancing service delivery, contact your IBM representative or IBM Business Partner, or visit **ibm.com**/systems/virtualization

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