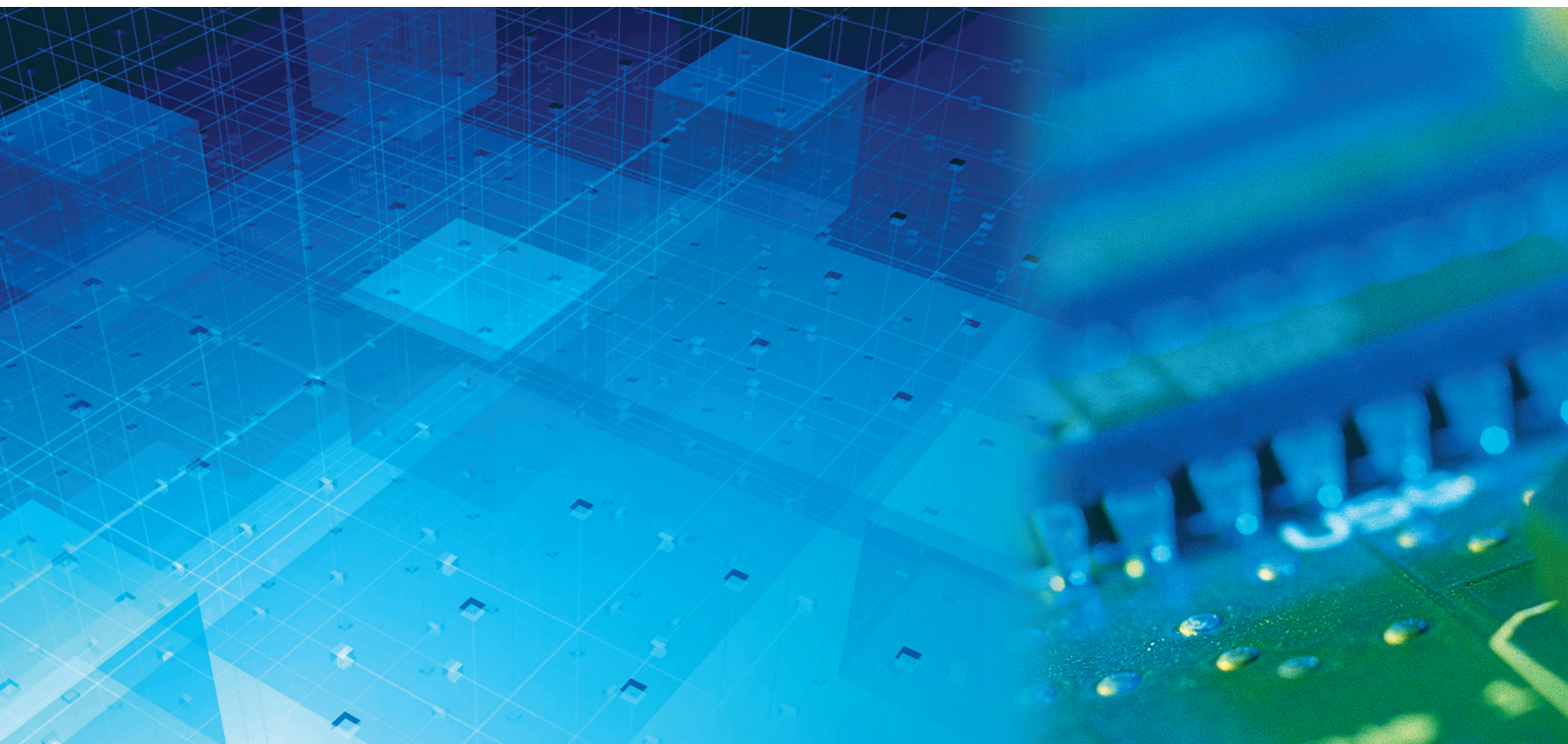


**Master the management challenges of your
virtualized environment with IBM Service
Management Solutions**



Realize the cost-saving benefits of a virtualized environment

Today's data centers have grown rapidly in size and complexity. At the same time, competitive and economic pressures have made cost control critical to data center success. To cut costs while continuing to meet service level objectives, organizations of all sizes are initiating projects based on strategies to simplify IT, consolidate resources, and increase energy efficiency. One of the technologies many organizations are leveraging to meet these goals is virtualization.

Virtualization offers the opportunity to reduce the physical footprint in the data center by enabling IT resource sharing and increasing utilization rates. While virtualization can produce significant cost savings as a result of reducing overhead, it does not address the single-largest cost element for most data centers – the labor to manage this environment – which can be as high as 40 percent of the overall cost.¹ If not controlled, management costs can negate the cost savings realized through virtualization.

Managing virtual systems is a complex undertaking that raises a number of tough questions: How will you handle server provisioning? How can you increase server and storage utilization? How are you going to manage increasing demand for virtual resources? What about software license management? Addressing these kinds of questions successfully requires effective tools to visualize, control and automate the virtual environment.

For many organizations, cost reduction may be a primary driver for deploying virtualization initially. But the full value of virtualization comes with being able to master the following management challenges:

- *Discover and visualize the physical and virtual environments and their relationships*
- *Rapidly provision the virtual environment*
- *Optimize the execution and maintenance of workloads*
- *Manage virtualized storage efficiently*
- *Manage software licensing to ensure cost-effectiveness*
- *Allocate IT costs appropriately*
- *Keep it all running.*

64 percent of organizations worldwide and 88 percent of organizations in the U.S. are currently investing in or planning to invest in virtualization technologies.²

If your organization needs to:	Start with:
Discover and visualize physical and virtual environments, understand configurations, and map applications and changes	Discovery and Dependency Mapping
Rapidly provision the virtual environment	Provisioning Management
Ensure that workloads run on schedule without disruption	Workload Automation
Achieve better storage utilization and standardize management of disparate storage systems	Storage Virtualization
Manage software licensing to ensure compliance and identify opportunities to reduce costs	License Management
Allocate IT costs appropriately, optimizing IT cost structures and providing visibility into IT spendin	Usage and Accounting Management
Keep it all running, meeting availability requirements and optimizing resource utilization	Monitoring and System Automation

While managing the challenges of a virtualized environment, you still must perform the same management tasks associated with any data center – virtualized or not. IT organizations still have to discover and monitor resources, manage the overall storage needs of the organization, and so forth. But the management tools now have to be smart enough for a virtualized environment.

Taking the right first step

Once you identify the concerns that affect your business priorities, you can focus on the kind of virtualization management solutions that directly address those concerns. This document is designed to help you get started. It outlines common challenges that lead companies to invest in virtualization management, and then describes the tools IBM offers that address each challenge.

Discovery and Dependency Mapping: Discover and visualize physical and virtualized environments

Effective IT service management requires complete visibility into applications, servers and networks in physical and virtualized environments. IT discovery software can help uncover information on these resources. IBM Tivoli Application Dependency Discovery Manager, for example, is designed to enhance IT service management by mapping real-time dependencies across the infrastructure. It supports a wide range of IT components, business applications, and processes, and the data it gathers can be used to determine which servers are candidates for consolidation and virtualization.

Tivoli Application Dependency Discovery Manager also provides information on configuration changes. Having knowledge of what resources could be impacted during a change – or knowledge of what has changed – can reduce the risk that changes will adversely affect service availability and reduce the time to isolate problems. The tool tracks configuration changes, depicts the information on topology maps and reports, and delivers comprehensive visibility into configuration drift.

Tivoli Application Dependency Discovery Manager can enable:

- *50 percent reduction in mean time to repair by quickly identifying and isolating configuration changes that affect service.*
- *10 to 20 percent reduction in deployed application rollbacks by understanding configuration item dependencies before making changes.*
- *84 percent reduction in time to inventory IT assets.³*

Provisioning Management: Rapidly provision the virtualized environment

One of the benefits of virtualization is that it allows IT organizations to bring large numbers of servers online in a very short time. But this agility puts added pressure on IT to get these servers “work ready” in that short amount of time. Manually deploying applications in virtual environments is time-intensive and can lead to errors, detracting from the value of virtualization and increasing an organization’s operating costs.

Automated provisioning can drive efficiencies in both labor costs and time. In fact, deploying complex, mission-critical applications to multiple locations automatically from a central point can save an estimated 35 percent in labor costs.³ IBM Tivoli Provisioning Manager enables customers to better manage their virtual environments by:

- *Reducing the time required to provision hardware, software and virtual machines.*
- *Simplifying the configuration of the supporting environment, such as network, storage and firewalls.*
- *Increasing utilization of existing resources while reducing energy consumption.*
- *Automatically deploying changes and releases.*

Workload Automation: Optimize the execution of workloads

Another benefit of virtualization is the ability to repurpose machines. Machines can be used by one team, then quickly retooled and allocated to another team, allowing critical workloads to take advantage of available capacity. Unfortunately, most applications require workload reconfiguration when their hosts change, which can drive up costs.

Dynamic workload scheduling tools, in conjunction with automated provisioning, can significantly ease the management of virtual environments, including those that require constant reconfiguration. IBM's solution for workload execution, IBM Tivoli Workload Scheduler, provides capabilities to:

- *Free up workload definitions by defining against logical abstract elements such as a database, a client, an in-house application, or a mounted disk.*
- *Adjust the environment dynamically based on activity, such as to increase disk, move database, or failover an in-house application.*
- *Optimize loads globally according to policies, across all servers and all applications.*
- *Show the impact of dynamic workloads on the critical path.*
- *Implement software high-availability for workloads at the data center level.*
- *Trace response time for any workload through ARM instrumentation.*

Storage Virtualization: Delivering a fully-virtualized information infrastructure

Businesses implement server virtualization to consolidate workloads and improve server utilization, to become more flexible and responsive in deploying applications, and to help improve disaster recovery strategies. But having only one part of the information infrastructure virtualized, while useful, has its limitations. For example, the absence of storage virtualization may limit what can be achieved with server virtualization.

IBM System Storage™ SAN Volume Controller (SVC) consolidates storage virtually to help achieve better storage utilization and also standardizes management of storage systems even from different vendors, which can improve administrator productivity significantly. When managed with IBM Tivoli Storage Productivity Center (formerly IBM TotalStorage Productivity Center), storage virtualization with SVC helps speed storage provisioning, complementing similar capabilities with server virtualization. Finally, in a virtualized storage environment, changes such as moving data or replacing a disk system can be made without impacting applications, complementing the high availability characteristics of server virtualization technologies.

IBM System Storage SAN Volume Controller can:

- *Improve storage utilization by as much as 30 percent.*
- *Reduce future storage growth by as much as 20 percent.*
- *Improve storage administrator productivity by up to double.*
- *Practically eliminate storage-related causes of application downtime.³*

License Management: Manage software licensing to ensure cost-effectiveness and compliance

It can be easy to misuse software licenses in a virtualized environment, because virtualized servers are so easy to turn on and off, and to move between teams. Effective software license management is critical in these environments. In addition to keeping track of what software is deployed in what virtual machine, and running on what partition, organizations need to identify over-licensed software in order to control deployment costs, and identify under-licensed software in order to maintain compliance.

IBM Tivoli Asset Management for IT and its discovery services for distributed and IBM z/OS platforms help address these issues by providing visibility into deployed software inventory (location and usage) as well as visibility into license entitlements. Having these data points makes it possible to determine software cost-effectiveness and to maintain a state of audit preparedness.

IBM Tivoli Asset Management for IT can help:

- *Lower total cost of ownership.*
- *Enable greater cost efficiencies for IT contracts and leases.*
- *Provide visibility and control over your IT asset inventory.*
- *Reduce software audit risk.*

Usage and Accounting Management: Allocate IT costs appropriately

Virtualization provides the promise of a more elastic set of servers that can be used on demand. But some managers have learned over the years to “horde” server resources, in an attempt to ensure that they have what they need. It’s up to the IT organization to anticipate and manage demand and to have full knowledge of the associated costs in order to substantiate the expenses incurred in delivering services to the business.

Usage and accounting solutions allow resource-usage tracking in shared environments. This capability provides insight into who is utilizing shared resources and to what degree. Such tools also provide a means to do chargeback based on usage, which drives accountability for costs. An effective usage and accounting management solution like IBM Tivoli Usage and Accounting Manager can:

- *Provide visibility of costs to determine profitability across lines of business, products and services.*
- *Present an understanding of costs to help justify expenses and future investments.*
- *Enable IT organizations to align costs with business objectives.*

Monitoring and System Automation: Keep it all running

Performance monitoring and reporting are vital to understanding how virtual machines are utilizing resources. Utilization reporting can identify resources that are trending to run out of capacity and resources that are underutilized and therefore candidates for consolidation. In addition to CPU, memory, and storage and network utilization, performance data can be collected on data center energy usage. This data can be combined with information on virtual to physical server inventory ratios to demonstrate how virtualization is reducing an organization’s energy footprint. In addition, availability monitoring can be used to help find problems with critical resources and alert operations teams before users are adversely affected.

Targeted monitoring with IBM Tivoli Monitoring or IBM Tivoli OMEGAMON can make it possible to:

- *Cut energy costs by 30 to 50 percent through consolidation and by monitoring and managing system power.*
- *Reduce hardware costs by improving utilization and deferring hardware purchases.*
- *Reduce time for problem resolution through launch-in-context problem identification and take-action capabilities enabled by dynamic workspace linking.*
- *Manage the interface to peer servers (SOA, application, systems) for maximum performance.*
- *Improve application availability by 7 to 10 percent, using proactive problem identification.*³

System automation is as critical as monitoring to maintaining continuous availability in virtualized environments. Administrators need automated tools to manage all the resources in order to help ensure the availability of the entire virtualized environment.

IBM Tivoli System Automation for Multiplatforms and IBM Tivoli System Automation Application Manager provide policy-based automation to drive movement of virtual machines and application-dependent resources. Automation for continuous availability of application-dependent resources also minimizes operator errors, which is a major contributor to application downtime.

Assembling the right solutions based on your business needs

Given the benefits, the question of whether or not to virtualize quickly changes from “Is it a good idea?” to “Who has the expertise to help us, and when do we start?” IBM Global Technology Services offers comprehensive virtualization services built on 40 years of client experience. Our portfolio of services includes strategy, design, planning, implementation, management, maintenance and support services. These services are modular in design, so clients can choose the specific services they need, when and where they need them.

The potential financial benefits of server consolidation and virtualization include:

- *Typical total cost of ownership savings of 30 to 70 percent.*
- *Hardware cost savings of 33 to 70 percent.*
- *Maintenance cost savings of up to 50 percent.*
- *Floor space and facility cost savings of 33 to 50 percent – and up to 80 percent if consolidating to Linux® on IBM System z.*
- *Energy cost savings of over 40 percent.*³

In addition to these financial benefits, virtualization can enable more efficient infrastructures that support greater business flexibility, enabling organizations to integrate diverse systems while improving utilization and performance.

IBM's industry-leading solutions help companies around the world successfully implement virtualization. By providing the tools, services and expertise to manage virtualized environments, IBM empowers companies with the visibility, control, and automation they need in order to effectively manage their infrastructures, maintain or improve their levels of service, and reduce operating expenses.



For more information

To learn more about IBM's Service Management Solutions™, contact your IBM representative or IBM Business Partner, or visit ibm.com/Tivoli/solutions/it-service-management. Additionally, IBM Global Financing can tailor financing solutions to your specific IT needs. For more information on great rates, flexible payment plans and loans, and asset buyback and disposal, visit: ibm.com/financing

IBM Corporation

IBM Software Group
Route 100
Somers, NY 10589
U.S.A.

The IBM homepage can be found at:

ibm.com

IBM, the IBM logo, ibm.com, OMEGAMON, Service Management Solutions, System Storage, System z, Tivoli, TotalStorage, and z/OS are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at:

ibm.com/legal/copytrade.shtml

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Other company, product and service names may be trademarks or service marks of others.

References in this publication to IBM products and services do not imply that IBM intends to make them available in all countries in which IBM operates.

No part of this document may be reproduced or transmitted in any form without written permission from IBM Corporation.

Product data has been reviewed for accuracy as of the date of initial publication. Product data is subject to change without notice. Any statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

THE INFORMATION PROVIDED IN THIS DOCUMENT IS DISTRIBUTED "AS IS" WITHOUT ANY WARRANTY, EITHER EXPRESS OR IMPLIED. IBM EXPRESSLY DISCLAIMS ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT. IBM products are warranted according to the terms and conditions of the agreements (e.g. IBM Customer Agreement, Statement of Limited Warranty, International Program License Agreement, etc.) under which they are provided.

The customer is responsible for ensuring compliance with legal requirements. It is the customer's sole responsibility to obtain advice of competent legal counsel as to the identification and interpretation of any relevant laws and regulatory requirements that may affect the customer's business and any actions the customer may need to take to comply with such laws. IBM does not provide legal advice or represent or warrant that its services or products will ensure that the customer is in compliance with any law or regulation.

- ¹ Kumar, Rakesh, "How to Cut Your Data Center Costs," Gartner, May 7, 2009.
- ² CA Program Study, Topic: Virtualization Management, 2008. http://ca.com/files/Presentations/virtualization_study_results.ppt
- ³ Metrics estimated by IBM in a lab environment using Alinean ROI Calculator.

Printed in the United States of America
07-09

© Copyright IBM Corporation 2010
All Rights Reserved.

