Datacenter Management and Virtualization

Microsoft® Corporation
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DATACENTER MANAGEMENT AND VIRTUALIZATION

Driven by the ever-present business needs to control costs, streamline operations, and improve organizational agility, many information-technology (IT) organizations have been attempting to optimize their datacenter services and derive more value out of their existing investments. Datacenter infrastructure and applications are increasingly being virtualized rather than being deployed on physical hardware. Further the industry is going through a transition to the potentially transformative trend of cloud computing that offers even greater opportunities to increase agility and reduce datacenter costs.

Customer Challenges in the Datacenter

Today's IT organizations face many serious datacenter challenges, including:

- **Delivery of Reliable Services.** This is the core challenge for IT organizations: they need to deliver highly available services in a reliable and predictable manner. Datacenters are becoming increasingly heterogeneous and globally distributed, requiring IT managers to have a holistic, operational view across all their datacenter environments.
- **Operational Efficiency.** With constant operational budget pressures, datacenter virtualization is often considered a key way to reduce costs. However, many organizations that have virtualized still struggle with escalating datacenter costs and datacenter complexity. For instance, virtual servers are often added to an ever-increasing landscape of virtual-server sprawl without any improvements in IT management and process flow. Additionally, compliance costs continue to rise due to increased regulatory pressures. This illustrates the need for simplified and automated processes combined with centralized management.
- **Improved Business Responsiveness.** In today's dynamic business environment, there is a lot of pressure on IT to be agile and responsive to changing business needs. This has implications in terms of building flexible and elastic IT capabilities to match IT capacity with business demand. In response, IT organizations have started to investigate cloud solutions. However, many are unsure of how and where to begin making such a transition.

DATACENTERS EVOLVING TO CLOUD COMPUTING: MANAGEMENT IS KEY

Many organizations have implemented virtualization initiatives and are seeing benefits like improved utilization, reduced floor space, reduced

power costs, and more. Microsoft sees private-cloud and public-cloud computing as the next logical step in datacenter optimization with the key driver being improved agility and business responsiveness. (See Figure 1.) Microsoft defines cloud computing as the ability to deliver IT as a standardized service, allowing IT managers to focus on areas where they can deliver increased business value and efficiency. The term "private cloud" is used when organizations enable their own cloud-computing capabilities on premises or via dedicated hardware from a third-party hoster. The term "public cloud" is defined as shared external computing resources hosted by third-party service providers.

Figure 1: Datacenters Evolving to Cloud Computing Deployment Models

Ultimately, many organizations will function with a hybrid model, taking advantage of the benefits offered by both private and public clouds with the flexibility between using on-premises, partner, or Microsoft datacenters. In this new kind of datacenter, common management will be critical to ensure IT organizations have holistic visibility into the performance, health, and availability of their datacenter services across physical, virtual, and cloud-based models. To effectively manage the complexity that may result from a hybrid datacenter model and to realize the full benefits thereof, process simplification and automation will also be crucial.

CLOUD COMPUTING BUILDS ON DYNAMIC IT

For the past several years, Microsoft has helped enterprise customers to mature their datacenter management and virtualization services and work toward the vision of "dynamic IT." Using the Core Infrastructure Optimization (Core IO) model, Microsoft has helped customers progress from a mostly manual, or "basic," infrastructure to one that's automated and aligned with the business, or which is referred to as "dynamic" (see Figure 2 for more information). During this journey, Microsoft has

delivered key dynamic-IT tenets, like unified management across physical and virtual environments, model-driven management, and service-focused management. Cloud computing builds on these tenets to deliver compelling agility and cost benefits.

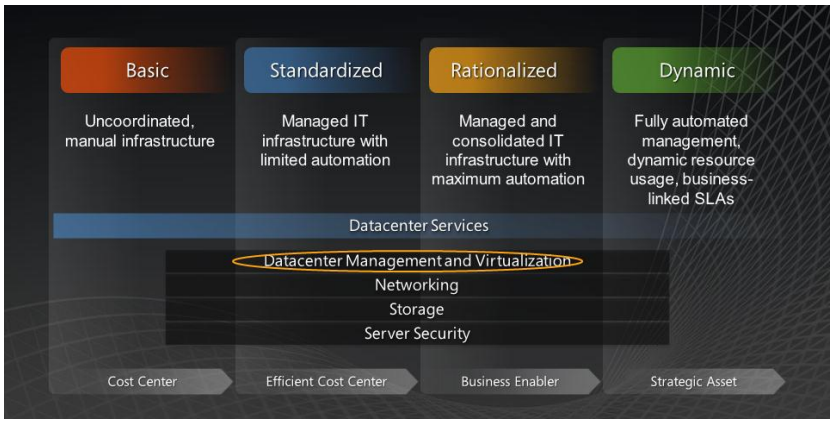

Figure 2: The Core IO Model and the Datacenter Management and Virtualization Workload

MICROSOFT FINDINGS ABOUT OPERATING CLOUD SERVICES

Based on experience running large-scale cloud services like Bing™, Windows Live®, and Windows Azure™, Microsoft believes cloud computing has the potential to unlock transformative agility and cost benefits across the full computing stack. Microsoft intends to bring these findings to enterprise datacenters through System Center product capabilities, so businesses can benefit from the Microsoft experience and expertise.

THE MICROSOFT APPROACH: BRIDGING THE GAP BETWEEN PRIVATE AND PUBLIC CLOUDS WITH COMMON MANAGEMENT

Microsoft will enable customers to accelerate their transition to cloud computing with its "server" and "services" platforms. The server platform, comprised of technologies like Windows Server® and System Center, will enable customers and partners (e.g., hosting service providers) to build customized public-cloud and private-cloud solutions in their datacenters, thus continuing to build on existing investments. Windows Azure provides the services platform and will help customers and partners leverage the power of standardized and turnkey cloud-computing solutions.

Regardless of whose datacenter is used for hosting, Microsoft can help bridge the gap between private and public clouds across the whole stack, from infrastructure to applications, with common management, identity,

security, and development models. As can be seen in Figure 3, IT is enabled to choose hybrid deployment models based on business requirements and ease of management across multiple environments, finding flexibility without added complexity. "Service-centric" management is a key tenet to help realize this vision. Service centricity involves holistic management of the service across the lifecycle of the service, including design, composition, deployment, configuration, monitoring, and data protection, regardless of whether the service will be deployed in private-cloud or public-cloud environments. Technologies like application virtualization, automation, and model-driven management enable this vision.

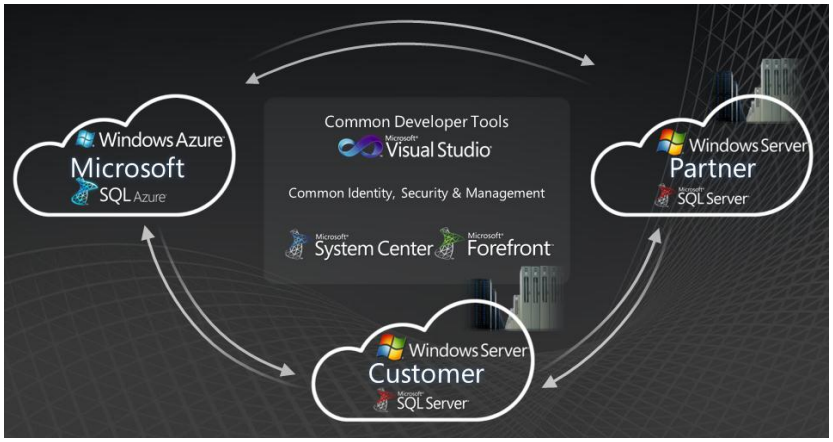

Figure 3: Bridging the gap between private and public cloud computing with common management

As an example of common management models across private and public clouds, organizations will soon be able to manage services distributed across on-premises and Windows Azure environments using an on-premises System Center "single pane of glass" console (see Figure 4).

To prepare for cloud computing today, organizations can build on existing investments in Microsoft technologies in the following ways:

- ***Scale Virtualization and Management* across the Datacenter**, including business-critical production applications and workloads. This will enable you to focus on optimizing your applications and services in preparation for flexible deployments in hybrid private or public cloud computing models.
- ***Plan for Common Infrastructure-to-application* Management** across physical, virtual, and cloud environments to enable holistic operational views across datacenter services.
- ***Standardize and Automate* Datacenter Management Processes,** starting with simplifying service management

processes based on industry standard models, like the Microsoft Operations Framework (MOF) and the Information Technology Infrastructure Library (ITIL), followed by automation to drive down costs and reduce complexity. Deep automation is essential to realizing the full benefits of cloud models.

- ***Have Homogeneous*** **Resource Pools**, as much as possible, to gain the efficiencies of scale that hardware virtualization can offer in cloud environments.
- ***Architect Cloud Optimized Services*** that are loosely coupled from the underlying infrastructure.

The Microsoft Datacenter Management and Virtualization solutions described below are fully aligned to support organizations in implementing the above guidance.

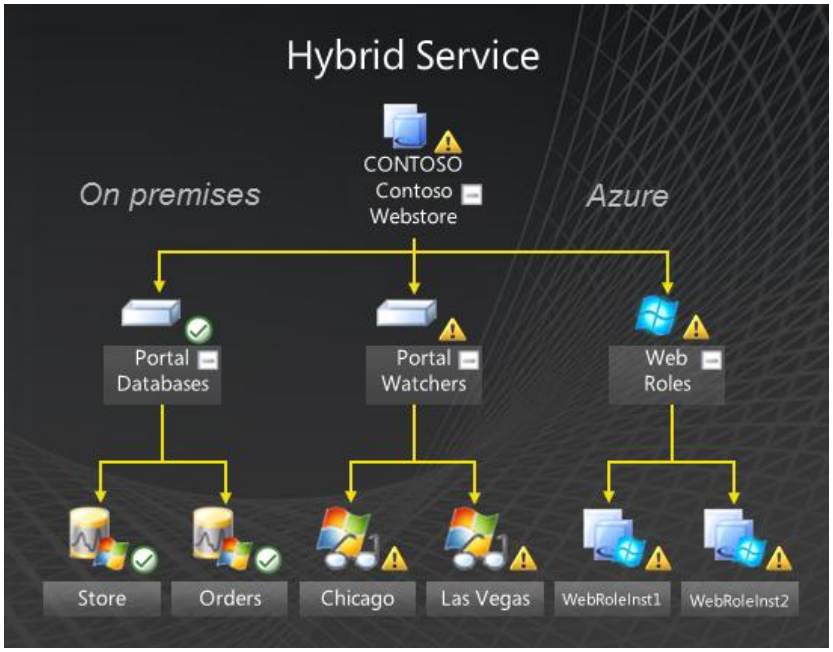

Figure 4: Common Management across On Premises and Windows Azure Environments

MICROSOFT DATACENTER MANAGEMENT AND VIRTUALIZATION SOLUTIONS

The following three Microsoft Datacenter Management and Virtualization solutions are key to helping enterprise organizations transition to cloud-computing. See Figure 5.

Figure 5: Prepare for Cloud Computing Today

Let's go over them in turn.

Optimize Service Delivery for Datacenter Infrastructure and Business-critical Services

Enterprise organizations can deliver reliable datacenter services with optimized virtualization management:

- ***Reduce Datacenter Complexity with Integrated, End-to-end Management across Heterogeneous Environments***. Please refer to Figure 6. System Center optimizes the management of mixed environments across a variety of scenarios. For example:
  - ***Deliver Packaged Workflow Integration*** with third-party management systems and tools with Opalis.
  - ***Provide Cross-platform Hypervisor Management***. System Center can manage both VMware and Windows Server Hyper-V™ technologies.
  - ***Facilitate Cross-platform and Distributed Application Monitoring*** for Microsoft products, UNIX, Linux, and more.
- ***Create Flexible, High-performance Virtualization and Management for Business-critical Microsoft Applications***. Microsoft provides best-of-breed virtualization for top-tier enterprise server applications like Exchange Server, SharePoint® Server, and SQL Server® software. Microsoft brings in-depth packaged application knowledge to enable high performance and availability.
- ***Optimize Datacenter Service Reliability with Cross-site Business Continuity and Disaster Recovery***. With advanced virtualization and management capabilities from Windows Server Hyper-V and System Center, organizations can implement

business-continuity solutions within and across datacenters to minimize downtime and improve service reliability.

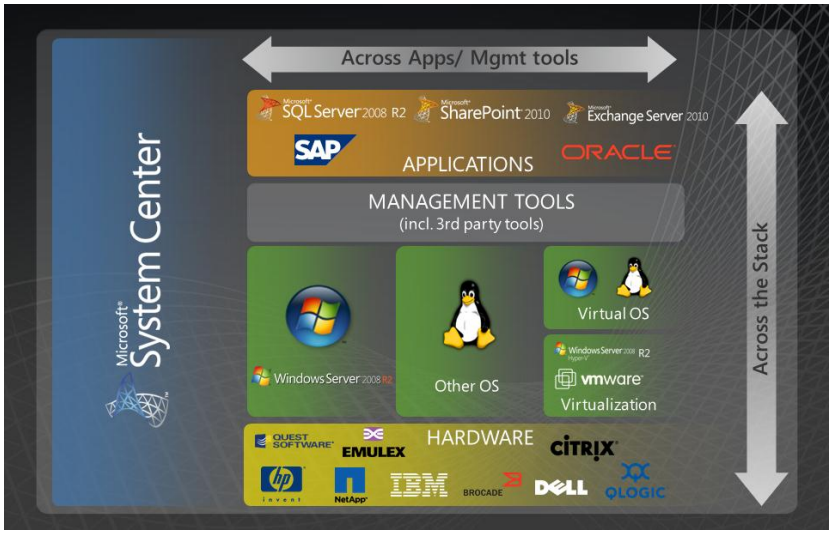

Figure 6: Optimize Service Delivery for Heterogeneous Datacenters

The above, combined with partner solutions, enable System Center to manage the whole stack, from infrastructure to applications, and to support and manage a breadth of Microsoft and non-Microsoft platforms, tools, and applications.

Automate Datacenter Management Processes and Support Change and Compliance

Enterprise organizations can improve operational efficiency by standardizing and automating datacenter processes in the following ways:

- ***Reduce Support Costs and Improve Reliability with Integrated Service Management Processes.*** System Center allows you to streamline datacenter management processes, like incident management, change management, problem management, and more, by implementing industry-standard best practices, like MOF and ITIL, in the form of integrated service management workflows and systems, like the Configuration Management Database (CMDB). This results in lowered operational costs and greater predictability in service delivery.
- ***Lower Costs with Orchestrated Automation of Repetitive Run-book Processes.*** Automating repetitive processes saves costs, reduces manual errors, and ensures repeatability in process execution. More importantly, it ensures scarce IT resources can focus their time on higher value-added activities. System Center automates workflows in an orchestrated manner between cross-silo processes, systems, and management tools. See Figure 7.

- ***Automate Enforcement of Risk Management and Compliance Using Packaged Knowledge.*** As seen in Figure 8, System Center enables organizations to demonstrate compliance with key industry regulations and standards by helping streamline end-to-end processes like establishing control objectives, automating implementation of control activities, and fulfilling audit requirements.
- ***Lower Costs by Automating Server Lifecycle Management.*** System Center automates server management using in-depth packaged knowledge and policies.

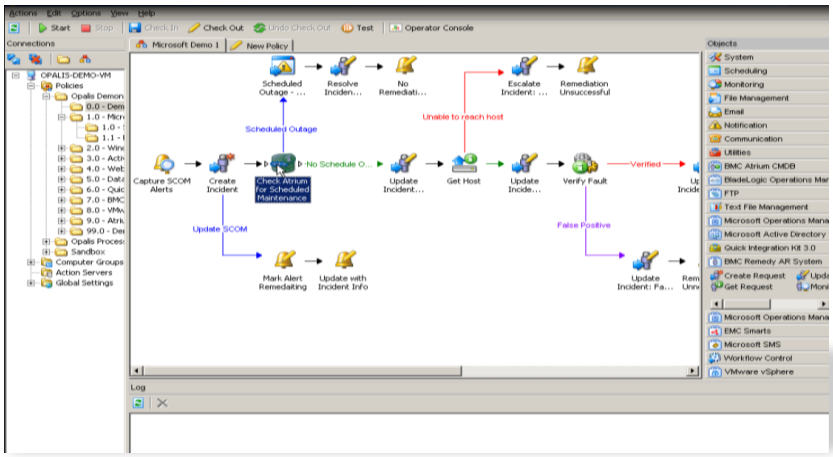

Figure 7: Orchestrated Run-book Automation of Datacenter Processes

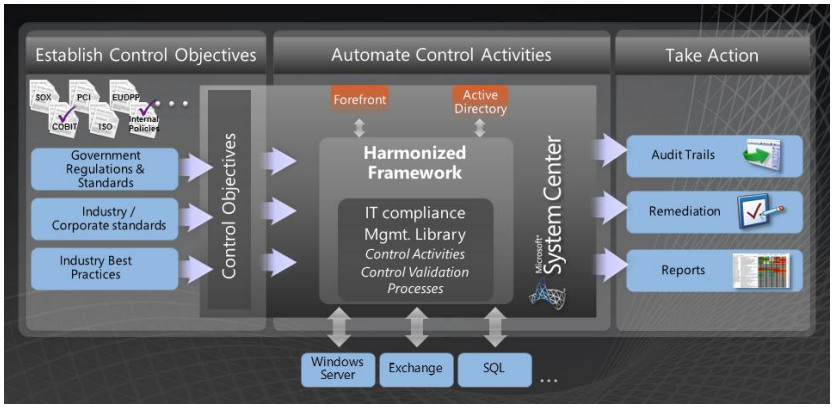

Figure 8: Automate Risk Management and Compliance

Deliver On-premises Private Cloud Computing Foundation

The Microsoft Server platform comprised of Windows Server Hyper-V and System Center can enable IT organizations to improve business responsiveness. This is accomplished by delivering on premises cloud computing infrastructure:

- ***On-premises Private Cloud Computing*** with pooled, shared infrastructure (see Figure 9 for additional details).
- ***Enhancing Business Agility*** with self-service IT.
- ***Packaged Guidance and Best Practices*** to plan and design dynamic datacenter infrastructure.

In this solution, the System Center Virtual Machine Manager Self-Service Portal enables enterprises to leverage their existing investments in the Microsoft infrastructure platform, while maturing their IT capabilities to assume advanced cloud capabilities.

The Self-Service Portal is a free, extensible solution that empowers datacenter administrators to dynamically pool, allocate, and manage resources to enable cloud computing on premises. Using this solution, IT organizations create agile, virtualized infrastructures and facilitate business agility, operational efficiencies, and reduced management complexity.

Capabilities of the Self-Service Portal solution include:

- ***Automation and Guidance*** with step-by-step instructions and technical best practices to help assess, plan, and design an on-premises cloud infrastructure.
- ***Organization and Business-unit Onboarding*** with automated workflows to onboard line-of-business applications to a virtualized, shared resource pool.
- ***Dynamic Provisioning Engine*** that can, in conjunction with System Center and Hyper-V, rapidly provision a virtualized infrastructure.
- ***End-user Self-service capabilities*** to request infrastructure in a self-service model for their applications and services.

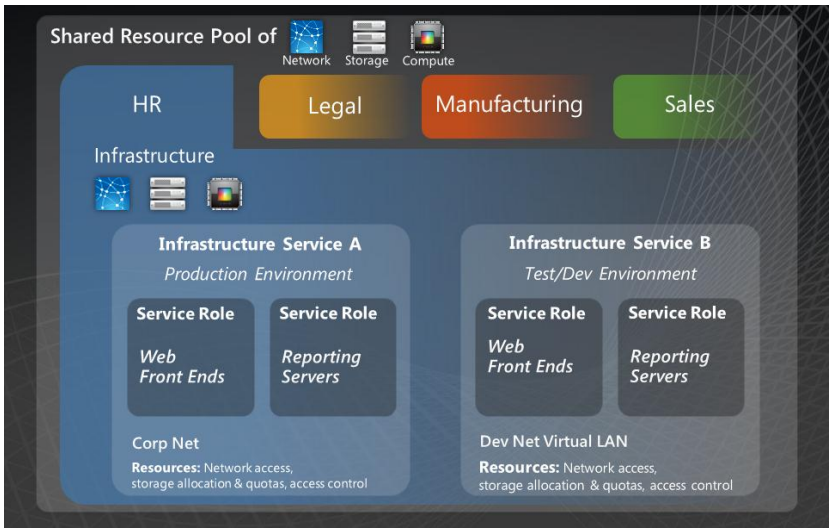

Figure 9: Deliver On Premises Private Cloud Computing Foundation

To learn more, please visit www.microsoft.com/privatecloud.

MICROSOFT SYSTEM CENTER SOLUTIONS: THE BUSINESS ADVANTAGE

System Center enables organizations to deliver agile, cost-effective datacenter services while evolving toward cloud computing. Please see Figure 10 for more information.

- ***System Center Has a Credible Vision for Bridging the Gap*** between private and public clouds with common management across the full stack i.e. infrastructure through applications. The in-depth experience of Microsoft in operating cloud services at scale from its global datacenters positions System Center to uniquely deliver on this vision.
- ***System Center Delivers Integrated Management*** across the entire service lifecycle using a common toolset across physical, virtual, and cloud environments.
- ***Microsoft Enables Organizations Improve Their Business Responsiveness*** with on-premises private cloud-computing infrastructure using existing and familiar investments in Windows Server Hyper-V and System Center.
- ***System Center Delivers High-performing and Available Virtualization-management Solutions*** for business-critical applications like Exchange Server, SharePoint Server, and SQL Server.
- ***System Center Delivers Compelling Datacenter Automation Scenarios*** that standardize and simplify datacenter processes, lower costs, and improve service reliability.

- ***Combined with Forefront® Technologies, System Center Enables Organizations Deliver Secure and Well-managed Datacenter Services*** on top of the Windows Server 2008 R2 operating system, Microsoft's industry-leading, enterprise-class cloud and datacenter platform.

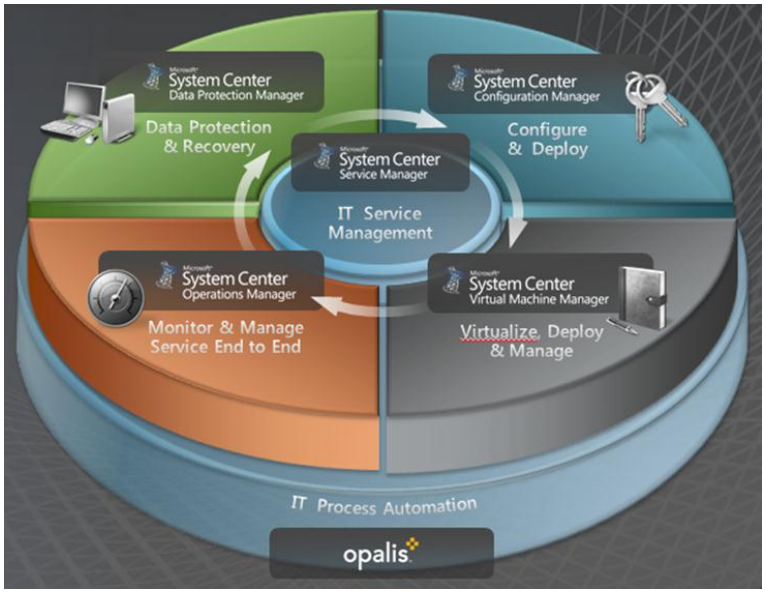

Figure 10: Drive IT Operations with Integrated End-to-end Management to Prepare for Cloud Computing

MICROSOFT SERVICES CAN HELP DELIVER OPTIMIZED, CLOUD-READY DATACENTERS

The Datacenter Services solution from Microsoft Services enables organizations to reduce costs, improve operational efficiencies, and drive business agility by delivering an integrated datacenter offering that leverages industry-leading architectures and principles. The solution encompasses three scenarios that progress IT infrastructure services from a basic level, through standardized and rationalized, and finally to a holistic, dynamic datacenter solution. This allows businesses to effectively deliver IaaS within their organization. Each offering stage is designed to be comprehensive and includes infrastructure, management, security, operations, support guidance, software, and processes that will allow enterprise organizations to evolve their datacenters in a controlled and predictable way.

For more information, please visit www.microsoft.com/services.

CALLS TO ACTION

- Educate yourself on the Microsoft datacenter-to-cloud vision by visiting www.microsoft.com/presspass/presskits/infrastructure/default.aspx
- Know more about the Microsoft Datacenter Management and Virtualization solutions by visiting www.microsoft.com/infrastructure/solutions/optimized-datacenter.aspx
- Leverage Microsoft Consulting Services to optimize your datacenter. Visit www.microsoft.com/services
- Use Solution Accelerators to optimize your datacenter. Learn more about Solution Accelerators by visiting www.microsoft.com/solutionaccelerators
- Talk to your account representative or Microsoft partner for additional implementation guidance

CONCLUSION

A well-planned transition to the cloud with datacenter management and virtualization technologies from Microsoft will help IT organizations provide reliable datacenter services, improve operational efficiency and enable deeper alignment with business objectives to transform their datacenters into a strategic IT asset.