IBM Software
Thought Leadership White Paper

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Deploy a dynamic, services-oriented cloud for your business

IBM delivers open-platform, cross-hypervisor cloud infrastructure and application management

IBM

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Introduction

There is no "silver bullet" in the cloud. No single product or packaged bundle can deliver all the virtualization you need to make the cloud real or all the control you need to make it effective. Heterogeneous, evolving and typically complex, the cloud requires a measured approach to its implementation and an integrated approach to its many components. A technology such as the hypervisor that creates compute virtualization is, in fact, only one of a cloud's many building blocks. When designing a cloud, organizations should consider the needs of the applications and workloads beyond compute virtualization such as networking and storage—and then evaluate the integration and control requirements across cloud and non-cloud business services.

Organizations should take a holistic approach to building a cloud, incorporating open technologies with proprietary ones; addressing all resources, whether the network, storage or compute; managing physical along with virtual machines; and retaining a focus on the business services the cloud supports. As vendors propose strategies that suggest a single "silver bullet" requiring wholesale adoption of a particular proprietary technology or porting of major business services or applications to their platform, organizations need to step back and consider the long-term implications of following such a strategy.

As virtualization and clouds grow, so do management challenges

For years, server virtualization has been on the rise, but by itself is not sufficient to give organizations the true agility they need in today's dynamic business and technology environments. To gain agility, organizations must expand their perspective beyond compute resource virtualization to include all of the infrastructure resources that support business services.

In response, a new infrastructure deployment and management approach has emerged in which the entire infrastructure—including compute, networking, storage and services—is virtualized, pooled and delivered as software.

But virtualizing the entire infrastructure is no simple matter. In fact, 100 percent virtualization is not only unlikely—it is not always wise. Some components of the enterprise infrastructure are significantly more difficult to virtualize than others, and even if their virtualization were possible, it would add little if any value to the business services they support. The old saying, "If it's not broken, don't fix it," is certainly something to consider when evaluating whether to make a significant change such as porting applications to virtualized or cloud infrastructure.

For despite their compelling advantages, virtualization and cloud computing also create new IT challenges. Growing numbers of virtual servers increase the resources requiring management. Maintaining application performance requires visibility through the virtualization layer. And workload planning, in which process efficiency and service delivery are improved by strategically placing them on systems with optimal capacity and performance, depends on understanding consumption of virtual as well as physical resources.

Virtual and physical, mainframe and distributed, resources must work together

Consider a few of the components that accompany a simple private cloud: self-service catalog, access controls, image and resource governance, performance monitoring, capacity planning, usage metering. And a business-transforming, enterprise-wide cloud requires even more: integration with physical systems, automated workflows and approvals, flexibility to deploy composite applications across multiple platforms, compliance with existing tools and processes.

It is clear that while virtualization is one key to enabling cloud computing, the needs of implementing and maintaining a cloud extend far beyond virtualization technologies. A holistic approach based on open standards and open-source software that manages physical as well as virtual machines, and that controls mainframes, distributed servers, applications, storage and the network on which they operate—always with an eye toward supporting business services—is necessary to meet the evolving demands of the cloud.

And with delivery of business services as a cloud's ultimate purpose, adopting an approach that addresses the many components required to deliver services becomes all the more important. For instance, a web server in the cloud might connect to a virtualized application server and a mainframe housing a database. It makes data available for processing or transactions on devices ranging from laptops and desktops to smartphones and tablets. And it passes data across a storage area network to systems where it is securely backed up to support regulatory compliance. Each device, technology and step in the process—along with the underlying management of network and storage layers—supports the business service. And each requires management.

Migrating complex environments to the cloud requires a phased approach

Based on the complexity of connections in the cloud and the numbers and types of technologies involved, IBM has found in its thousands of client engagements that an incremental approach to virtualization and cloud projects is most effective. The first step is to tackle simple infrastructure components such as web servers that are often standardized and frequently exhibit low utilization. As the process continues and the virtualized environment grows, however, some applications and critical business services may be better served if they are not virtualized—especially if virtualization requires porting to another platform.

Technologies such as hypervisors that provide resources to applications may be largely interchangeable. But the tasks and processes required to deploy and manage those applications are often manual—and the source of high costs and errors. Moving critical business applications to virtualized and cloud environments requires a level of process orchestration that goes beyond simple infrastructure management.

In a virtualization or cloud initiative, then, it is important to remember that resources and tasks are different.

It is necessary, as a result, to take into account all the technologies and connections that go into delivering a service, and to provide not only virtualization but also the varied and necessary levels of management and process control that support its successful operation. Simply bundling proprietary cloud software with hypervisors does not meet the complex requirements of today's clouds.

In fact, approaches that require porting of application components to a proprietary hypervisor typically create unnecessary migration costs at the minimum. At the worst, they have the potential to leave business services crippled.

The IBM approach focuses on delivering business-critical services

The IBM approach delivers the core automation and centralized management for a virtualized or cloud environment—and extends those capabilities across virtual and physical machines to cloud-based business services that are managed, optimized and scaled based on demand and policy.

This is an approach that considers the business services your organization is trying to deliver and then adapts to fit your organization. It supports multiple hypervisors, storage systems and network virtualization layers, giving you a choice of which components to virtualize on which technologies optimized for the particular workload. Focusing on the business service and the process to deliver and manage the service helps align IT goals with business goals. In doing so it is an approach that can better integrate with and leverage the technologies of an organization's existing environment, while providing flexibility in cost and performance. And by moving beyond limited yet expensive proprietary offerings, it can provide full management and optimization of applications, not just the virtual machine container.

What is more, as hypervisors and infrastructure management are commoditized, value is shifting to higher levels closer to the business service. Leveraging standards and open-source cloud platform software such as OpenStack becomes key to delivering a cloud management platform that provides cross-vendor management for Infrastructure-as-a-Service (IaaS) offerings as well as higher-level middleware-based platform services and application-based business services.

Cloud infrastructure management from IBM delivers superior results

Cloud offerings from IBM are built to be fast and scalable whether you are provisioning simple virtual machines or complex business services that include application patterns, compute, network and storage configurations.

Rapid provisioning for a service provider

Leveraging IBM hardware, software and storage technologies, SLTN, a managed service provider in the Netherlands, enabled its customers to support legacy and cloud-based applications under a single platform. SLTN dynamically provisions virtual storage and compute resources on both Linux and Windows platforms in seconds, integrating private clouds with existing application services and reducing its own IT administration time by 50 to 70 percent.

Improved management for a bank

In order to raise the quality of its application services, US-based KeyBank needed to improve its management of capabilities such as health monitoring, performance monitoring and event tracking by eliminating technology-specific silos. IBM solutions have positioned KeyBank to incorporate a business service perspective into its technology operations to more effectively detect and resolve problems that reduce business performance.

Integrated networking in financial services

Consip S.p.A., a public stock company owned by the Italian Ministry of the Economy and Finance, faced a heterogeneous environment that offered limited integration and lacked centrally defined monitoring and notification processes. An IBM Integrated Service Management solution for the data center enhances visualization across mixed system and network architectures, driving faster event response and boosting uptime.

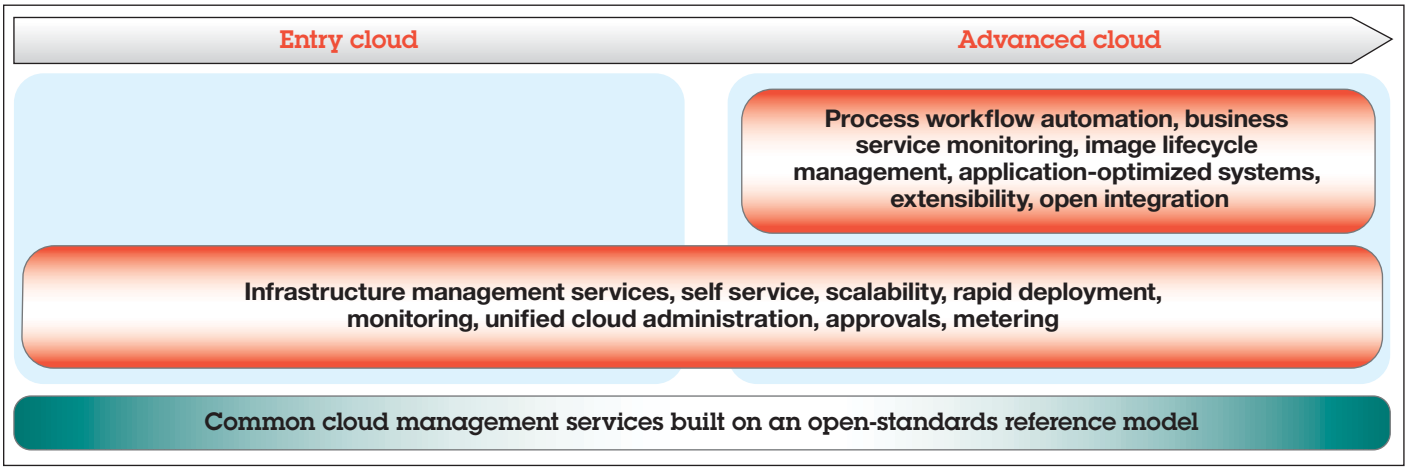
The IBM approach supports the move to a services-oriented cloud

For organizations of all sizes, with heterogeneous environments and the full range of business service needs, the IBM® SmartCloud® portfolio supports the shift of data center virtualization to the cloud. At the same time, it helps IT maintain process control and compliance while moving its focus from low-level operational concerns centered on virtualization to a focus on higher-level business services.

By leveraging common cloud services that enable the delivery of different types of clouds from a single foundation based on OpenStack, IBM solutions can control large pools of compute, storage and networking resources across hypervisors. And with high-level capabilities such as workflow automation and application pattern deployment, clients can define, build, orchestrate, manage and report on the services that are critical to the business.

IBM capabilities for ensuring the flexibility clouds require and for handling the complexity created by the connections and dependencies of business services are longstanding and well established. Leveraging the commoditization of infrastructure, IBM solutions can manage distributed and mainframe servers as well as virtual and physical machines. To deliver the broad management capabilities that shape the dynamic, services-oriented data center, IBM solutions provide visibility into system performance, image management, data protection and security—and they do it as the data center grows from an entry-level configuration to advanced cloud capabilities.

Capability progression to a dynamic, services-oriented cloud



IBM reaches beyond virtualization to support cloud management

IBM solutions provide the full range of capabilities necessary to evolve virtualized systems to a comprehensive, cloud-based data center. Beginning with virtualization as one key building block, IBM solutions help improve performance across the entire virtualized, cloud or physical infrastructure—including compute, storage and network resources—enhance application and service delivery, lower costs and reduce risk by providing management tools for the entire data center lifecycle.

Provisioning

- IBM cloud provisioning and orchestration solutions are designed to reduce the IT management complexities of heterogeneous hypervisor and hardware environments as they allow the enterprise to respond to changing business needs.
- IBM solutions combine infrastructure and platform capabilities to deliver elastic workload management; image lifecycle management; resilient, high-scale provisioning; and the rapid creation of service platforms for a wide spectrum of workload types.

Application and performance monitoring

- IBM management solutions are designed to detect performance problems quickly and to provide visibility that enables understanding of when and why performance has degraded.
- IBM monitoring solutions track health and performance of private cloud infrastructures over time, providing critical insight to plan for capacity growth or to shrink footprints to reduce licensing while maintaining performance goals.

Development operations

- IBM solutions automate the development operations lifecycle to bridge service delivery gaps, to improve time to market and quality, and to reduce development costs and risk.
- The solutions' ability to leverage the cloud alleviates the need for developers to worry about resource constraints; the automated configuration of environments and applications reduces the risk of defects due to manual configuration.

Storage

- IBM storage solutions provide centralized, automated, highly scalable data protection for streamlining management operations such as backup and recovery management and hierarchical storage management, while utilizing advanced data reduction techniques including deduplication, compression and tape management.
- Storage virtualization solutions designed for virtualized and cloud environments help speed data migration to an agile cloud architecture while improving storage availability and performance. This helps reduce the cost and complexity of data growth as it simplifies storage administration.

Networking

- IBM network management solutions help automate network provisioning associated with the onboarding of new clients to improve deployment time and eliminate network configuration errors that may result in costly outages.
- The IBM System Networking Software Defined Networking (SDN) architecture harnesses the new OpenFlow protocol as a new paradigm for virtual, dynamic, flexible networking. IBM solutions offer workload-optimized patterns for instant configuration and rapid provisioning of software-defined networks. In addition, the IBM Distributed Overlay Virtual Network (DOVE) enables administrators to implement virtual application networks (VANs) delivering network services that are transparent for cross-data center orchestration, automation and mobility of virtualized workloads.
- While most vendors are stopping at virtualizing the network based on OpenFlow, IBM offers network management solutions that provide real-time infrastructure visibility, control and automation to support the operational efficiency necessary to respond to a dynamic, anytime/anywhere business marketplace.
- Workload and system automation solutions help optimize system performance and improve resource efficiencies across virtualized and cloud environments.

Control desk and IT service management

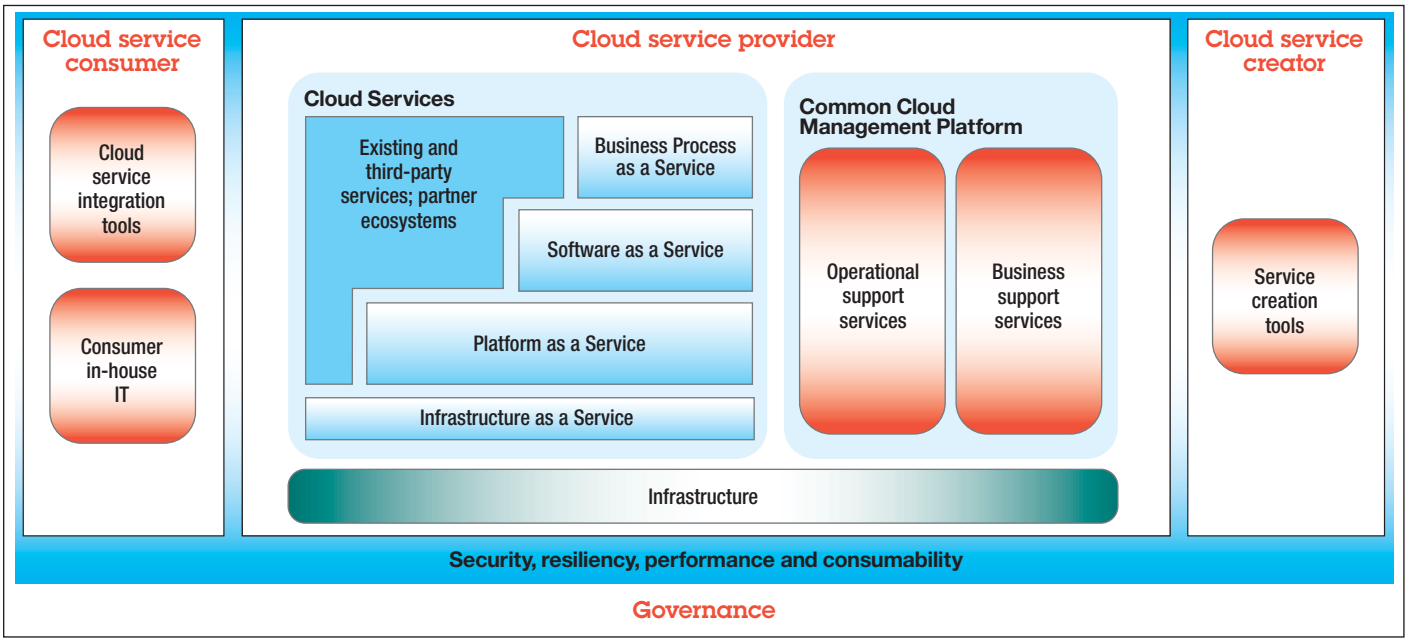
- IBM service management solutions are designed to meet the growing demand for user support services while ensuring hardware and software inventories are accurate and up to date.
- IT Infrastructure Library (ITIL)-compliant solutions include capabilities for service desk, self-service catalog, change, configuration and release management, IT asset lifecycle and compliance management, multi-customer support for service providers, and anytime/anywhere access via mobile support.

The IBM approach to virtualization and cloud management brings together these and other capabilities to break down not only silos of technologies but also silos of organizational operations, to streamline processes and build opportunities for collaboration that enhance business services still further.

IBM leverages deep expertise to make the dynamic data center real

The IBM vision of the services-oriented data center is built on integrated IaaS (network, compute, storage), Platform-as-a-Service (Paas) and IBM SmartCloud Foundation, which is designed to help organizations easily build and rapidly scale private cloud environments. The ability of IBM SmartCloud Foundation offerings to move clients from virtualization to a comprehensive cloud implementation leverages experience with more than 4,000 clients that is captured and represented by IBM Cloud Computing Reference Architecture, a suite of work products representing best-of-breed IT industry knowledge and insight on how to architect, design, implement and manage clouds.

IBM Cloud Computing Reference Architecture



Capturing the aggregate experience of hundreds of IBM experts in building cloud environments and service-oriented architectures, Cloud Computing Reference Architecture provides a methodology for building and operating a cloud. This includes the definition of business drivers, functional and non-functional requirements, and the corresponding solution architecture, defining the recommended software and hardware components and the ways in which they integrate.

Conclusion

On today's smarter planet, where systems and organizations are more instrumented, interconnected and intelligent than ever before, both the numbers and importance of virtualization and cloud computing deployments are rapidly increasing. IBM understands the reality of existing complex, heterogeneous data centers and leverages that knowledge and best practices to provide superior solutions for building and maintaining a cloud-based data center focused on delivery of business services.

Designed for the heterogeneous environments that most organizations operate, IBM solutions support an open, technology-agnostic virtualization approach, control connections in addition to applications, and manage physical and virtual machines as well as mainframes and distributed servers.

For more information

To learn more about IBM solutions for virtualization, cloud environments and the dynamic data center, contact your IBM representative or IBM Business Partner, or visit: **ibm.com**/software/tivoli/features/vmware/index.htm

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