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Managing Cloud Infrastructures: Growing Adoption Drives Operational Needs

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The use of cloud-based architectures to develop and deploy business-critical applications and services is rapidly expanding. Growth in cloud deployments is being driven by the need for business agility — the ability to deliver rapid development, production deployment, and ongoing updating and modification of applications — combined with the need for cost savings; universal network availability; user self-service; Web, mobile, and handheld access; and efficient use of shared infrastructure. Competitive pressures are upping user expectations for availability, reliability, and performance for cloud-based solutions as more and more applications are hosted on cloud platforms — including IaaS, PaaS, and SaaS — deployed as public, private, or hybrid cloud infrastructures.

The following questions were posed by BMC to Tim Grieser, program vice president for IDC's Enterprise System Management Software research, on behalf of BMC's customers.

Q. How mature is the cloud market becoming?

- A. Deployment of applications on cloud-based infrastructures has progressed well beyond the early stages of development and test "sandboxes" to now include production environments and even mission-critical applications. While early cloud deployments were predominantly built on public cloud infrastructures, today's rapid growth is increasingly fueled by adoption of private clouds and hybrid cloud architectures.

Use cases include collaboration, corporate email, customer-facing financial services, ERP applications, IT support including help desk, incident and problem management, sales enablement and management, and many others. As a result of increasing application deployments, cloud-based production environments are subject to the same standards for availability, reliability, and performance as more conventional infrastructure deployments.

Q. What technologies are being adopted to deliver cloud services?

- A. Cloud services are operated on platforms built up from virtualized infrastructures created with hypervisors from sources such as ESX, Hyper-V, Xen, and KVM. The evolution from virtualized infrastructures to cloud services platforms involves not only supporting virtualization but also adding more layers of management and automation software. Cloud services platforms often link to more traditional operating environments and physical infrastructures. Cloud services architectures include such functions as a full-service catalog, automated self-service provisioning, orchestration, support for multitenancy, elastic scaling, dynamic pooled resource management with advanced analytics, and usage metering/chargeback. Cloud services infrastructures are typically created in the context of a plan-build-run cloud life cycle. Many IT

organizations already manage their virtualized infrastructures with software tools for monitoring, automated provisioning, and service management.

From a business initiative perspective, one of the key drivers behind cloud adoption is the need for agility — particularly the ability for rapid development, deployment, and modification of customer-facing applications. The overwhelming trend toward "consumerization" of IT — especially access to applications from handheld, mobile, and tablet devices — demands rapid response in terms of IT support. From a business perspective, there are numerous factors to consider, such as what cloud source(s) to use. For example, possible choices for cloud deployment include SaaS-based public cloud services, public IaaS or PaaS services, in-house private cloud deployments, or hybrid combinations. Another key requirement is to ensure that cloud-based deployments will meet customer and end-user expectations for performance and availability. IT organizations need to decide how they will manage the cloud in combination with more traditional systems.

Q. What are some unique issues IT organizations need to consider when managing and optimizing clouds?

- A. Despite many automated features, a cloud does not operate itself. Indeed, for many IT organizations, introducing a new cloud services capability can be disruptive in terms of IT operations. For example, acquiring a private cloud facility may bring in new operational processes, unfamiliar management components, and tools or interfaces not supported by platforms in other areas of the datacenter.

Basic operational consoles or displays may be unique to the cloud platform, and the range of IT management functions will typically be extended to include dynamic workload balancing and placement, service-level management and capacity management in a multitenant environment, and complex problem determination and root cause analysis. These extensions and the increased complexity may require new staff skills or training in new operational processes in order to successfully manage the cloud infrastructure.

Because cloud-based workloads can potentially utilize resources both inside and outside the corporate datacenter, operational management and control software must be able to cover the extended shared infrastructure domains made possible as a result of cloud implementation. These environments, with dynamic allocation of resources to workloads to meet variable user levels and support peak intervals on demand, pose new challenges for operational management to constantly meet required user service levels. Virtual machine motion and dynamic resource elasticity add further management challenges in cloud environments.

Q. What new capabilities are required to successfully manage and optimize private, public, and hybrid cloud services?

- A. Cloud architectures add operational complexity in a number of areas, including multiplicity of components — both physical and virtual, pooled resource usage with increased sharing, dynamic workload resource allocation, unpredictable demand, and widely variable peak loads. A fundamental requirement for managing all types of cloud environments is expanded visibility to understand the utilization, performance, and availability of cloud-based services and shared fabric resources. IT operations must be able to monitor the extended cloud infrastructure in order to gain visibility into how resources are being utilized, how workloads are performing, and whether problems or bottlenecks are developing that will impact users.

Visibility is provided by extended monitoring capabilities — both agent based and agentless — together with informational displays such as dashboards or graphics. Visibility entails not only displaying monitor information but also providing context — such as service, location, thresholds, use of shared pools — and capabilities for taking actions such as moving or assigning additional resources to workloads in order to meet performance requirements.

Another key management capability for cloud environments is intelligent analytic software to help process and evaluate the increased volume of monitor data, identify impending issues and their cause(s), and make recommendations or take actions to optimize performance and availability. Functions that can be performed by intelligent analytics include performance analysis, trending, and forecasting; predictive problem analysis and prevention; impact analysis and root cause analysis in complex, dynamic, shared resource environments; and capacity analysis and optimization including the use and impact of pooled resources. Automated actions such as workload placement or movement, allocation or deallocation of pooled resources, configuration of cloud service parameters, chargeback, and problem triage and repair can be accomplished through the use of intelligent workflows.

Q. What are the benefits of adopting an integrated cloud life-cycle management and cloud operations management solution?

A. A cloud life-cycle management solution enables IT organizations to plan, build, deploy, and operate cloud services according to processes and functional software that help ensure that projects are completed quickly and reliably. A cloud operations management solution supports management and optimization of cloud operational performance, availability, and resource utilization. By adopting an integrated approach to cloud life-cycle management and cloud operations management, IT organizations can more cost-effectively deliver on the promise of the cloud, providing end users and customers with the speed and service quality they expect from cloud-based applications and services. Key benefits that can result from this approach include the following:

- Higher user and customer satisfaction with performance and availability due to improved cloud service levels
- Greater agility and quicker time to market for cloud services and applications
- Gains in operational efficiency through automated workflows resulting from integrated software and processes
- Improved resource utilization
- Lower operational costs

IT organizations that are planning or implementing cloud services deployments should carefully consider these benefits when deciding on a strategy for cloud operations management.

ABOUT THIS ANALYST

Tim Grieser is program vice president of IDC's Enterprise System Management Software program and is responsible for system management software research. His coverage includes software for managing systems and applications across a wide variety of platforms. A key focus area is ebusiness and distributed applications performance and availability, especially Web applications response time from the end-user perspective.

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