

# IBM SmartCloud Application Performance Management for Dynamic and Cloud Infrastructures

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# IBM SmartCloud Application Performance Management for Dynamic and Cloud Infrastructures

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# IBM SmartCloud Application Performance Management for Dynamic and Cloud Infrastructures

## Introduction

This ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) paper discusses the challenges of managing applications in highly dynamic IT environments such as public and private Clouds.

Modern enterprise applications are engineered for agility and frequently deployed over elastic IT infrastructures. The benefits of virtualization, public/private Cloud, and hybrid deployments can include flexibility, efficiency, and business enablement. However, these benefits come at a price. Multiple factors, such as varying workloads and “just in time” provisioning, introduce risks to quality of service. Performance and availability can be compromised, particularly when IT organizations lack Application Performance Management (APM) solutions designed to support dynamic infrastructures.

IBM SmartCloud Application Performance Management (SmartCloud APM) is engineered to support the most demanding, complex, and mission critical applications on the planet, regardless of deployment methodology. This EMA white paper details the reasons why it is important for today’s management toolsets to support Cloud and similar dynamic infrastructures, and highlights IBM’s answer to the challenge of building service assurance into complex application ecosystems.

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## Modern Applications, Architectures, and Infrastructure Options

Today, nearly 75% of medium-sized to enterprise-sized companies are developing and hosting custom applications. Of these, almost 80% (see Figure 1) use J2EE or other Java-based languages. Tiered Web applications are commonplace, and 50% of companies have deployed applications in Service Oriented Architecture (SOA) environments (see Figure 2). In addition, over 60% have deployed services over private Cloud, and 55% are leveraging some form of public Cloud.

One common characteristic of modern applications is that they are integrated and abstracted. Virtualization, for example, abstracts software-based virtual servers from underlying hardware. SOA abstracts software execution from dependencies on specific hardware. And Cloud abstracts entire IT environments from the data center.

As businesses move from the monolithic application architectures of the past to these complex ecosystems, application governance and management become significant concerns. The more dynamic the environment—for example, as companies begin to make use of technologies such as Cloud-bursting and VMware vMotion live server migration—the more rapidly applications can spin out of control. Lacking a consolidated view across such environments, IT organizations are in the dark regarding application and transaction performance and availability. This puts customer satisfaction, employee productivity, and even revenue at risk.

The challenges multiply as J2EE server instances proliferate. Companies running multiple J2EE applications often rely on application servers such as IBM® WebSphere®, which add enterprise-grade functions such as security, clustering, connectivity, and scalability. These powerful capabilities enable very sophisticated Web and tiered applications, which tend to be mission and revenue critical.

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Often, such applications are the very lifeblood of the business. Financial services companies, for example, tell EMA that the cost of downtime is approaching \$15,000 per minute. In such environments, application quality is not an option—it is a “must have.” The problem with supporting such deployments, however, is that they introduce new management challenges that demand increasingly intelligent management toolsets.

One such challenge is the difficulty of tracking application dependencies. Without discovery and topology modeling, it becomes virtually impossible to keep track of which infrastructure elements support which applications. Lacking this information, IT organizations find that root cause analysis is a time-consuming process that adversely impacts Mean Time to Repair (MTTR). VMware vMotion and similar virtualization technologies exacerbate the problem, since the physical servers hosting an application can change with a mouse click.

As another example, WebSphere server clustering enables J2EE applications to scale. However, without tools that can penetrate the cluster container to deliver visibility to underlying Java Virtual Machines (JVMs), troubleshooting becomes a matter of making educated guesses and resolving problems via trial and error.

Application heterogeneity is another challenge, since many of today’s transactions span multiple platforms and delivery mechanisms. It is common, for example, to leverage Microsoft’s .NET framework for the user-facing portion of a transaction and J2EE to access back-office data. The problem is further compounded as transactions increasingly span on-premise and Cloud.

Tracking the end-user experience across diverse distributed environments goes far beyond the capabilities of silo management solutions. It is no longer possible to diagnose application problems by consulting the mainframe console or the network tool. Leading-edge APM toolsets incorporate deep-dive diagnostics, rolling baselines, predictive analytics, visibility to infrastructure and integration points, and discovery, among other features.

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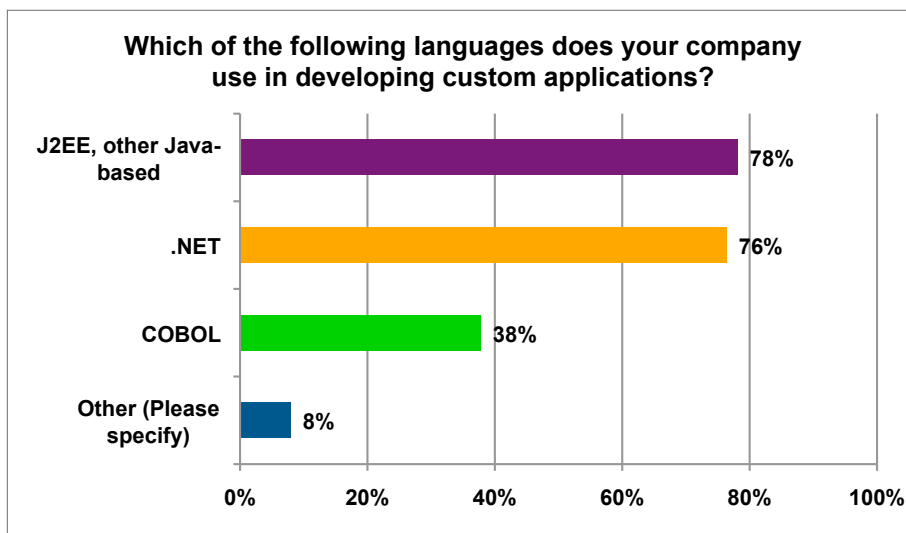


Figure 1: Java language use in the enterprise

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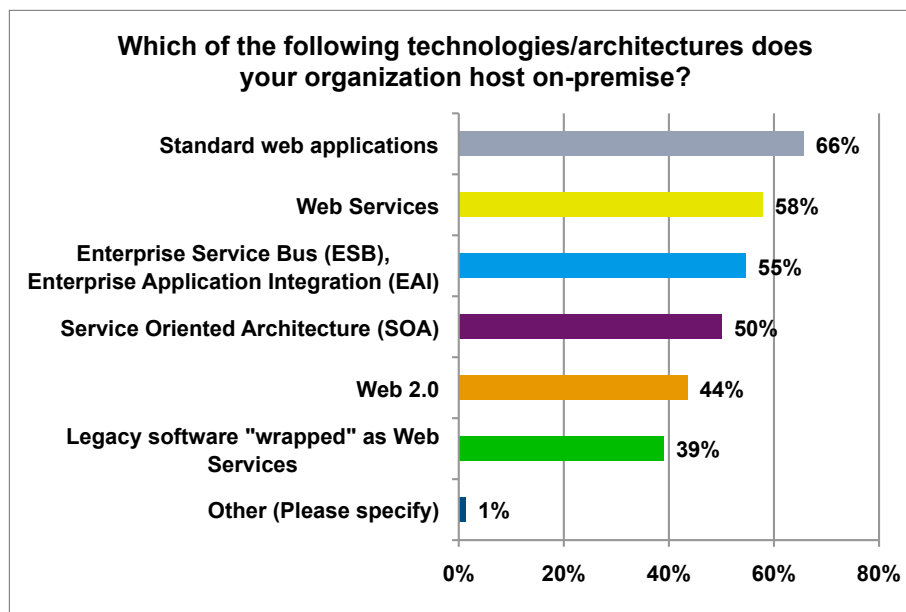


Figure 2: Tiered, connected application architectures are commonplace

## Dynamic IT Environments

IBM SmartCloud APM incorporates today's "most wanted" capabilities to address the challenges of managing modern, dynamic IT infrastructure supporting complex transactions. The solution covers five key capability areas: discovery, end user experience, transaction tracking, enterprise diagnostics, and analytics. It is delivered as a single, lightweight, seamlessly integrated solution leveraging a common foundation to monitor and manage the IT infrastructure underlying applications AND support application availability and performance.

SmartCloud APM is designed for quick and easy deployment, providing customers with rapid time to value and fast Return on Investment (ROI). It combines monitoring and lightweight discovery functionalities with alerting and reporting on the availability and performance of transactions, applications, and underlying infrastructure.

Infrastructure monitoring delivers performance, availability, alerting and reporting for foundational technology such as servers, databases, and networks. End User Experience monitoring and transaction tracking extend the value proposition to application-level monitoring. This combination builds a foundation for maintenance, proactive management, and troubleshooting performance and availability at the service delivery layer.

A key value proposition for companies using WebSphere is SmartCloud APM's visibility to WebSphere Application Server (WAS), WebSphere portal, and WebSphere extended products. Middleware is, of course, a key component of today's massively integrated application systems, and management solutions that lack middleware visibility have "blind spots" at the touch points (integrations) between execution components.

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SmartCloud APM's discovery capabilities are essential for linking the infrastructure and application (service) layers. It combines lightweight, standards-based discovery with analysis of transaction flows between components, providing both top down and bottom up views of transaction execution. It builds and maintains a "living topology" of application flow to trace the path of each transaction and deliver deep dive diagnostics when necessary.

Discovery and topology mapping are key requirements for monitoring Cloud and other dynamic environments, since transactions from the same application can take variable paths through the underlying infrastructure based on load balancing, clustering, and other factors. Without adequate tools, searching for problems in such environments is like searching for the fabled "needle in a haystack."

In terms of day-to-day application support, the topology models created by SmartCloud APM deliver multiple advantages. They are invaluable tools supporting virtually every aspect of IT Business Service Management (BSM), data center management and application support. They also build a strong foundation for IT Service Management (ITSM), supporting both the tactical disciplines within Service Support and the more strategic disciplines of Service Delivery.

SmartCloud APM delivers an "always accurate" view of application execution, which enables IT support professionals to:

- Quickly find new systems requiring monitoring or management
- Understand which systems support which applications (and how applications interrelate with one another)
- Prioritize problems more efficiently based on the importance of the application (and therefore the server) to the business
- Speed the process of root cause analysis, improving uptime.

IBM SmartCloud APM automatically correlates and analyzes application and system resource data to quickly identify, isolate and resolve application bottlenecks. Built-in interactive reporting spans real-time and historical operational data for support and trending purposes, and traps and alerts proactively advise IT personnel of potentially troublesome situations before they impact end users. Policy-based management speeds the configuration of new managed resources, while seamless integration provides end-to-end management across distributed and mainframe applications and platforms.

## IBM SmartCloud APM Customer Scenarios and Use Cases

### *Customer Scenario 1: Web Traffic Multiplied 100X—for Two Weeks per Year*

Most business IT environments are sized for "normal" loads. When "normal" utilization is exceeded by a significant margin, virtually any Web site will bog down, grind to a halt—or fail altogether. This was exactly the scenario faced by the Australian Open when it introduced new interactive, real-time tools to its fan base just in time for the 2008 tournaments.

During the two weeks of the event, these systems had to be available 100% of the time to service a record 7.4 million unique users generating nearly 220 million page views. This represented a 50% increase in site traffic over the prior year.

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IBM, as the Official Technology Partner of the Australian Open, plays “a major role” in the event by providing both IT infrastructure and manpower. In introducing the new capabilities, Australian Open and IBM personnel leveraged IBM technology to develop Service Oriented Architecture (SOA)-based services that combined disparate data from a variety of distributed sources to deliver interactive scores, maps, and schedules to tennis fans worldwide.

By virtualizing the server environment, using IBM technologies to develop SOA integrations, and leveraging IBM products to deploy a world-class security system, the two partners “achieved flawless delivery.” They delivered a flexible, high performing environment that achieved business objectives and did so at high levels of security.

The results were impressive, and included:

- 50% increase in Web site traffic from previous year
- 100% Web site availability
- 40% reduction in cost per visit 2004 – 2008
- 23% reduction in energy consumption 2004 – 2008
- 25% reduction in cooling demands 2004 – 2008.

(More information on the Australian Open story is available at: <ftp://public.dhe.ibm.com/common/ssi/pm/ab/n/tic14027auen/TIC14027AUEN.PDF>)

## *Customer Scenario 2: Global Expansion Introduces New Requirements for Scalability, Reliability and Flexibility*

Global financial markets have had a roller-coaster ride in recent years as the world economy has been buffeted by unexpected and repeated adverse events. At the same time, and perhaps as a result of these economic challenges, surging trade and settlement volumes have taxed the capacity of underlying processing systems.

Depository Trust and Clearing Corporation (DTCC) is a clearing house for processing investment transactions. When DTCC decided to go global, it was necessary to build new levels of reliability, scalability, and flexibility into the processing platform. The platform had to be capable of addressing an increasingly volatile and turbulent financial environment.

To address this challenge, DTCC partnered with IBM to build a strong and stable foundation for business growth. Jointly, they leveraged an IBM mainframe platform, IBM DB2®, CICS®, and IBM WebSphere MQ to build a scalable, Java-based Service Oriented Architecture.

By shifting from monolithic applications built using classic COBOL and Assembler, DTCC built a flexible platform capable of adapting to changes in volume and regulatory oversight. The new system also enables DTCC to become more flexible in rolling out new services, a key factor in growing into new global and adjacent markets.

The results were impressive, and included:

- 77% increase in overall transaction processing capacity, enabling DTCC to handle 3 times the highest volume ever recorded
- 100% rate reliability, with US\$1.5 quadrillion in trades settled annually
- 25% reduction in cost per transaction, giving DTCC the lowest cost per transaction in the world
- Rebates of excess transaction fees of more than U.S. \$580 million to customer/owners.

(More information on the DTCC story is available at: <ftp://ftp.software.ibm.com/software/solutions/pdfs/ODC03021-USEN-00.pdf>)

# IBM SmartCloud Application Performance Management for Dynamic and Cloud Infrastructures

## IBM SmartCloud APM Key Differentiators and Value Proposition

- *Agentless or agent-based monitoring OR a combination of both:* While many of today's vendors deliver performance tools based on either agentless or agent-based monitoring, IBM is one of the few that enables customers to "mix and match" the two. Lightweight, agentless monitoring can be used for less critical applications and systems, while agents can be installed on those which are more mission-critical. All monitoring reports back to the same integrated console and fewer agents mean less system and administrative overhead.
- *Comprehensive support for heterogeneous hypervisors and other foundational technologies:* Larger enterprises have often virtualized across mainframes, Linux, UNIX, and Windows, which means that management toolsets must address this heterogeneity. Even midsized companies either have multi-vendor hypervisors or will in the future. In addition, today's companies are seeking broader integration between previously siloed technologies, support teams, and business constituencies. IBM continues to build integrations across tools supporting development and operations, monitoring and Service Desk, and IT and business assets. With its breadth of coverage for middleware, architectures such as SOA, and for almost any conceivable business model, IBM's consolidated value proposition becomes increasingly compelling as businesses grow.
- *Predictive analytics and self-learning:* Every IT organization is seeking to become more proactive in managing business applications. However, few management solutions truly address this requirement. SmartCloud APM "watches" production environments, maintains "rolling baselines," and develops an understanding of normal operations based on factors such as time of day, day of week, and time of month. Operations personnel are notified BEFORE an application problem can impact users, and deep-dive diagnostics provide actionable information required to fix the problem.
- *End user performance monitoring:* Full range of end-user response monitoring including real-user experience and synthetic monitoring. "Deep dive" drill-down enables IT operations personnel to navigate a transaction topology (service model) to facilitate isolation of the problem component.
- *Mobile Device support:* IBM SmartCloud APM now supports a variety of mobile devices.
- *Redesigned, Web 2.0-based dashboards:* Newly designed dashboards provide simplified drill down to reveal the source(s) of a problem, while embedded "expert advice" guides users in making a speedy and successful resolution.
- Cost Effective
  - *Significant price reductions for non-production use:* For SmartCloud APM, IBM prices non-production licenses at a discounted cost compared to production licenses. This has implications for DevOps, because it makes it possible for the same toolset to be used by Developers, Testers, Deployment, and Operations teams. In effect, the tools provide a "common language" that enables technical professionals with diverse skills to communicate more effectively across the iterations of the application lifecycle. This also promotes more thorough testing across the lifecycle, mitigating failed rollouts and software version rollbacks.
  - *Virtualization and Cloud support:* SmartCloud APM incorporates virtualization-aware resource monitoring to support optimal use of virtualization and Cloud technology.
  - *Data analytics:* Integrated data warehouse and portfolio-wide common reporting is included with the solution at no additional cost.



# IBM SmartCloud Application Performance Management for Dynamic and Cloud Infrastructures

- *Fully integrated across the application/business service lifecycle:* One of IBM Software's unique differentiators is the level of integration across the product line. SmartCloud APM can help companies facilitate the transition from siloed teams to seamless integration between Development and Operations. In fact, APM's value proposition extends across the full lifecycle because it integrates with products supporting Development, Operations, Network Management, Service Desk, and similar key business and technology functional areas.
- *Improved Business Alignment:* IBM Business Service Management offerings, with SmartCloud APM as a foundational component, provide IT organizations with tools to demonstrate relevance and business value. BSM dashboards help business executives visualize how Key Performance Indicators (KPIs) map to IT operations, which helps both business and IT to make better decisions. BSM solutions also help IT optimize resources, proactively identify and prevent potential issues, and ensure IT services meet or exceed contracted service levels to address business priorities.

## EMA Perspective

J2EE applications, by their nature, are complex to manage. They are modular and distributed, network-connected and integrated, SQL and resource intensive. This combination introduces challenges that are only aggravated when virtualization and Cloud are added to the mix.

The problem is compounded by a variety of factors. One is that a significant number of companies are still trying to manage today's complex applications with silo-focused tools. Another is that many of the companies that have already invested in application or transaction management products find that their tools do not translate well when they move to modern dynamic architectures. And a widespread challenge is "spotty" coverage—tools cover certain aspects of an application or transaction, but are "blind" to others.

The IBM APM solutions are engineered to address the challenges of modern enterprise applications. IBM continues to invest in its APM solutions, adding capabilities to address technology advancements on an ongoing basis. This ensures that customer investments continue to maintain value over time. IBM has also invested heavily in improving ease of consumption and ease of use by re-vamping the licensing scheme and introducing the solutions in multiple form factors.

Flexible licensing and ease-of-use improvements make SmartCloud APM an attractive alternative for smaller companies as well as enterprises. This puts enterprise-grade management tools within reach of companies of virtually every size, a claim that most competitors cannot match. In addition, IBM's recently-added enhancements to .NET support will be an attractive value-add for companies of every size.

IBM's investments in the APM solution are noteworthy. Companies seeking a way to mitigate the challenges of modern application architectures are encouraged to check out IBM SmartCloud APM.

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## About IBM

For more information about IBM, please visit: [www.ibm.com](http://www.ibm.com)

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## About Enterprise Management Associates, Inc.

Founded in 1996, Enterprise Management Associates (EMA) is a leading industry analyst firm that provides deep insight across the full spectrum of IT and data management technologies. EMA analysts leverage a unique combination of practical experience, insight into industry best practices, and in-depth knowledge of current and planned vendor solutions to help its clients achieve their goals. Learn more about EMA research, analysis, and consulting services for enterprise line of business users, IT professionals and IT vendors at [www.enterprisemanagement.com](http://www.enterprisemanagement.com) or [blogs.enterprisemanagement.com](http://blogs.enterprisemanagement.com). You can also follow EMA on [Twitter](#) or [Facebook](#).

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