IBM's Versatile Approach for Optimizing Business Service & Application Performance in a World of Accelerating Change

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*IT & DATA MANAGEMENT RESEARCH,
INDUSTRY ANALYSIS & CONSULTING*

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Introduction

As IT organizations struggle to keep up with an accelerating pace of change in terms of both business and technology options, traditional, siloed approaches to business service and application performance management are becoming increasingly ineffective. To optimize business services and application performance, IT organizations need a complete picture of all IT assets and services that contribute to customer and user experience. That complete picture should include both an up-to-the-minute accurate inventory of application configurations, as well as predictive analysis of how business services are likely to perform based on current of projected changes in IT infrastructure. This disparity between the complete picture required for IT and business professionals to optimize performance and the fragmented or out-of-date picture they all too often have to work with is only exacerbated by new technologies such as Cloud computing, Web 2.0 applications, and application/business ecosystems involving a complex array of partners and service providers.

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Fortunately, there are technology and organizational trends that are helping IT organizations to cope more effectively with complex business service and application ecosystem performance issues, including infrastructure, middleware, lifecycle, and business-related interdependencies.

This ENTERPRISE MANAGEMENT ASSOCIATES® (EMA™) report looks at IBM's industry leadership in business service management, application availability, and performance management. It will examine IBM's Service Availability and Performance Management (SAPM) portfolio from both a structural perspective and a functional (capabilities-related) perspective, and then put these solutions in the context of customer requirements and trends in the enterprise IT industry overall.

Market Requirements for Effective Service and Application Delivery in a Rapidly Changing Global Economy

Employers are demanding ever-higher levels of productivity from their employees. Customers and partners expect information and services on time and can shift loyalties with increasing ease when business transactions and communications are encumbered by frustrating latencies. As a result of these and other factors, IT organizations are required to deliver a consistently high level of Quality of Experience (QoE) over an IT infrastructure that is more complex, varied, and dynamic than ever before. To meet these objectives, both IT and business professionals actively concerned with the performance of critical business applications are coming to depend on comprehensive management tools and real-time and historical visibility into a wide range of technologies and dependencies.

Market requirements for IT solutions for business service management and application performance management include the following:

- **Comprehensive Management** – Application ecosystems require visibility across a wide range of interdependencies, including mainframe environments, Web applications, mobile services, network infrastructure (including Layer 2 and 3 devices such as switches and routers), and Cloud computing (including Cloud services running on premise and those running in third-party hosted environments). To be truly comprehensive, management solutions must offer features for discovering, classifying, and mapping IT assets in real time in a cost-effective manner – including

both initial purchase and deployment costs as well as ongoing administrative overhead and support. Comprehensiveness also implies not only real-time analysis, but also historical analysis of baselines and trends, as well as predictive analysis of likely performance results in the future. Finally, comprehensiveness implies taking advantage of all possible data sources, including those created by other departments, such as the development teams of custom applications, or those using multi-brand management investments.

- **Support for Triage and Cross-Functional Teams –** Good performance management solutions will enable level 1 and level 2 responders to troubleshoot and resolve performance problems quickly. These responders include help desk/service desk personnel, custom application engineers, data center engineers, and NOC engineers. They may also occasionally include developers, QA staff, and other subject matter experts who can contribute to a timely resolution to an issue. And when a business is mature enough to have developed strong User Experience Management (UEM) groups, as an example, these cross-functional teams typically include business professionals concerned with dollars-and-cents impacting outcomes. To improve operational results, many enterprises have in recent years created cross-domain triage or service management teams that reflect the cross-domain dependencies of performance troubleshooting and optimization. These teams are becoming more formalized and organizationally empowered.

While many of these teams are operationally focused across networks, systems and applications, others are becoming more lifecycle-oriented. For instance, the rise of "DevOps," a sharing of tools, information, and processes across development teams and operational teams, promises to give developers valuable "real-world" insights from operations for improving the performance and reliability of custom applications, while giving operations teams access to test scripts and knowledge of applications internals that previously would have been confined to the development department. Coordinating activities among all stakeholders, for example, automatically opening a trouble ticket with the appropriate subject matter expert including development when appropriate, is a key requirement for accelerating problem resolution and improving business service delivery.

If an application-related problem is escalated beyond Level 1 support, which group is it escalated to for each of the following application types? Custom Applications

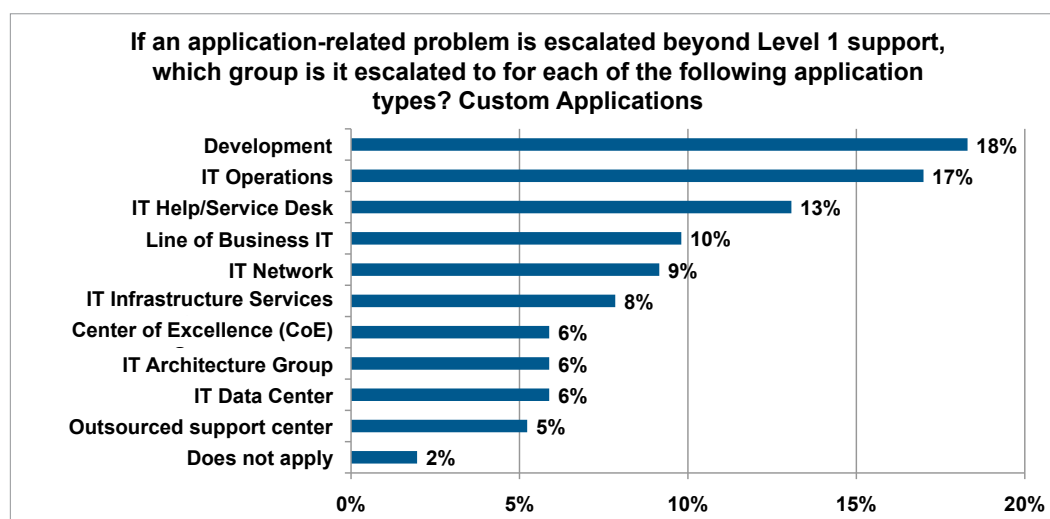|	
Development	18%
IT Operations	17%
IT Help/Service Desk	13%
Line of Business IT	10%
IT Network	9%
IT Infrastructure Services	8%
Center of Excellence (CoE)	6%
IT Architecture Group	6%
IT Data Center	6%
Outsourced support center	5%
Does not apply	2%

Figure 1: For production performance issues with custom applications, developers are the number one subject expert of choice. Data from the same EMA research shows that custom applications predominate over third-party applications in most enterprises

- **Focus on Quality of Experience (QoE) –** One of the most effective ways to help both IT and business managers make smart decisions about application performance is to offer insight into User Experience – that's where the handshake occurs between the "product" (business service) and the "consumer" or user. In a recent survey of enterprises about QoE, 71% of respondents agreed that business and IT share responsibility for QoE, and 78% of respondents felt that QoE solutions must support triage for isolating problems that affect end-user experience. It should also be pointed out that in the majority of instances, this same data showed the QoE or UEM teams are more often than not driven from business executives and professionals outside of IT who are concerned with the impact of IT services on the business.

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- **Support for Cloud Computing –** Cloud computing is accelerating the requirements for real-time, cross-domain business service and application management, as well as promoting other critical capabilities, such as advanced analytics, application discovery and dependency mapping, service level management, and other functions. Cloud services include internally managed private Clouds, subscriptions to public Cloud services, and "hybrid" Clouds that combine private Clouds and public Clouds, typically in order to scale up resource pools during times of peak loads. About 46% of enterprises have already made a commitment to Cloud technologies, according to a recent EMA survey, and of those with committed plans, 55% considered their Cloud initiatives to be "critical" or "important." The impressive adoption rate of Cloud computing makes it a technology area that no enterprise-class performance management solution can afford to ignore. And Cloud is, according to this same research, accelerating requirements for versatility, flexibility, dynamic insight and robust cross-domain awareness of critical application services and their infrastructure interdependencies.

IBM Service Availability and Performance Management

IBM is distinctive in the breadth of domains it supports, including systems, virtualized infrastructures, network, database, middleware, storage, and end-stations including PC and mobile devices. And perhaps even more importantly, IBM allows operations to view these "domains" *cohesively* both from an applications/service perspective, as well as in context with the business processes and outcomes they impact. IBM's SAPM capabilities aim to give both business and IT teams the visibility, analysis, and controls they need to make smart decisions about applications, services, infrastructure, and business priorities.

The company seems intent on making its SAPM solutions as comprehensive as possible. For instance, it offers a development solution, Agent Builder, to rapidly create extensions for monitoring and managing third-party applications, services, and devices, ensuring that operations have access to broad coverage of applications performance data across layers 2-7 of the ISO stack. In addition, Agent Builder allows third-party monitoring solutions to be effectively integrated with the IBM SAPM solution, so that companies can leverage their APM and BSM investments in a more consistent and effective way.

Linking application monitoring to business service monitoring, IBM SAPM includes *Tivoli Business Service Management (TBSM)*, a powerful business-service impact management dashboard with strong supporting analytics. TBSM service modeling extends naturally to support the inclusion of logical associations such as business outcomes with application and transaction-related performance issues, and is also fully reconciled with the Tivoli Common Data Model as used throughout both Tivoli Application Discovery and Dependency Manager (TADDM) and IBM's CCMDB.

TBSM can harvest events and alerts to map across Key Performance Indicators (KPIs) impacting the performance of business services and generate alerts, reports and analyses. These in turn can support critical requirements for collaboration between both the business and IT and across IT.

IBM TBSM can leverage a variety of sources, most notably IBM Netcool Omnibus for cross-domain event analysis and IBM Netcool Impact designed to interrelate service performance with business-related behaviors, such as ensuring that compliance-related auditing software for financial services is optimized to perform effectively at 4:00 p.m. at the end of every trading day. IBM Netcool Omnibus has established itself as an industry leader in the breadth of sources it can support from IBM and third-party solutions for correlating events based on high priority service and business policies.

> Because of its versatility and modular design, IBM's SAPM allows IT organizations and service providers to begin with different use-case priorities, and at different levels of maturity, leveraging pre-existing (IBM, non-IBM third-party, and home grown) investments in monitoring, and evolve in convenient stages towards a more complete service and application performance model.

Moreover, IBM has recently enhanced its already significant support for User Experience Management (UEM), improving end-to-end visibility into complex transactions. And now, further broadening the coverage of its portfolio, IBM is extending its capabilities for managing applications in Cloud and virtualized environments.

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The IBM solution also provides a bridge between operations and development – a best practice for Application Lifecycle Management – through the reuse of test scripts for custom, business-critical applications. By re-using load test and unit test scripts in production environments, operations teams gain insight into application performance that would be difficult to achieve any other way.

Unique Platform and Architectural Strengths
IBM's SAPM portfolio encompasses a broad range of products covering different platforms (IBM AIX, HP-UX, Linux, and many others), different monitoring and management functions (such as agentless testing), and different operational specialties (such as the increasingly critical benefits of ITM for Energy Management).

A more structural approach to understanding IBM's core platform strengths for end-to-end application performance management is as follows:

Performance management begins with the **discovery and analysis of IT assets and their dependencies.** Tivoli Application Dependency Discovery Manager (TADDM) provides foundational insights into service modeling, application-to-application, and application-to-infrastructure interdependencies. Using tokens, TADDM automatically discovers the many Configuration Items (CIs) involved in a transaction and maps those CIs to specific applications and services. To extend the reach of this discovery and analysis, TADDM features an open API, a plug-in framework for sensors, a Software Development Kit (SDK), and support for assimilating data from third-party products, and as such is an industry leader in reconciling multiple discovery systems into a single, coherent whole. In addition to mapping CIs and their dependencies, TADDM can also monitor configurations for compliance and provide critical, service-impact-related insights for change management.

The Tivoli portfolio also includes specialized **monitoring solutions**, such as internet service monitoring, monitoring for cluster managers, monitoring for energy management, and monitoring for virtual servers. These solutions are straightforward additions to existing monitoring solutions and build on the same integrated infrastructure. Monitoring solutions can tie business-service KPIs to business calendars, so that IT analysis of application performance can take into account regularly scheduled business processes and predictable variations in system load.

Agent Builder is an IDE that plays an increasingly important role in extending the reach of IBM SAPM solutions. An easy-to-use development system that enables IT engineers to create custom monitoring agents within minutes, Agent Builder also enables TADDM to integrate with third-party devices, services, and applications that might otherwise go unmonitored (systems, network, etc.). It supports standards such as CIM, JDBC, JMIX, and Perfmon. And most critically, Agent Builder also allows IBM customers to integrate third-party monitoring solutions within the IBM SAPM portfolio, so that the Tivoli portfolio can become the assimilative heart of an end-to-end business service and application performance management strategy.
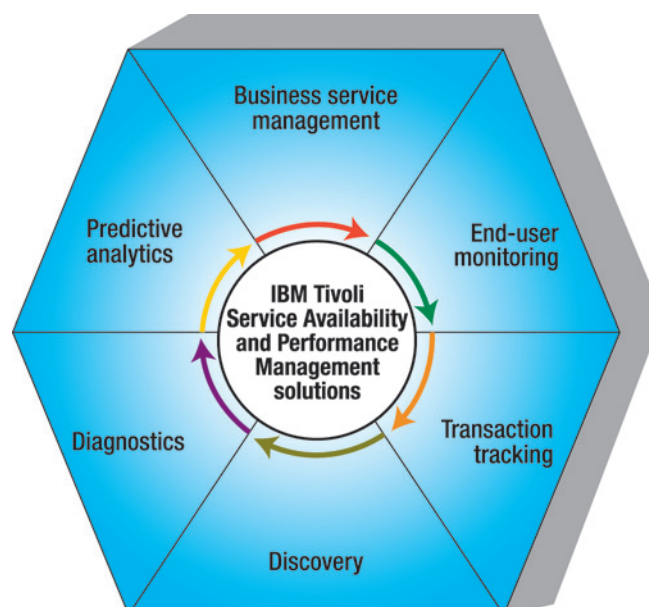

Figure 2: The IBM Tivoli Service Availability and Performance Management (SAPM) Platform

Collecting information from widely disparate sources can lead to coherent analysis only if all analysis components share a common vocabulary and correlate their metrics. The **Tivoli Common Data Model (CDM)** is a central design requirement for SAPM and extends service modeling to the real-time world of service and application performance management. Fully compatible with IBM's Change and Configuration Management Database (CCMDB), the Tivoli CDM is optimized to provide clear connections between application CI performance attributes and the configuration changes that can so often impact performance. The CDM also allows critical infrastructure, application and transaction performance information to plug directly into Tivoli Business Service Management (BSM) service models.

Performance metrics from any system, application, and agent can be stored as raw data or as summaries in the Tivoli Data Warehouse. Reporting on this data is made possible through **Tivoli Common Reporting (TCR)**, which includes hundreds of report templates which can be used as is, or customized with a graphical editor.

Tivoli Integrated Portal (TIP) is a Web-based portal that integrates dashboards and reporting from all Tivoli products. It offers users the convenience of single sign-on into their monitoring environment, and it helps ensure that access to dashboards and reports are secure. In addition, it lets users think in terms of tasks, rather than products; users select the task they want to complete, rather than selecting a product they assume is associated with a task. This versatility is critical in assimilating business service performance insights from a wide variety of sources to support the many different technology and business roles relevant to effective BSM.

Advances in Transaction and User Experience Management

IBM provides a rich set of solutions for analyzing application responsiveness and end-user experience. The IBM Tivoli Composite Application Manager (ITCAM) for Transactions enables IT teams to monitor transactions in real time, leveraging a variety of measurement techniques and data sources. To provide operators with rich, detailed performance data, ITCAM offers a variety of approaches to performance monitoring:

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- ITCAM dynamically discovers key components involved in a business transaction and creates topology mappings to aid in analysis. In addition, it defines performance baselines for each domain involved in a transaction, based on historical performance.

- ITCAM includes a new agent-less Web response-monitoring tool that returns detailed metrics about Web transaction characteristics. To ensure that Web monitoring itself does not interfere with Web server performance, enterprises can run this service on a dedicated server. This agent-less monitoring is an easy way to get started with transaction monitoring, as it does not require any instrumentation of application or use of special agents. It also helps to round out insights across distributed infrastructures and can support ITCAM's ability to generate what IBM calls "Persistent Topologies" based on transaction ecosystems. These can in turn be exported to TADDM for analysis and comparisons.

- ITCAM can also run synthetic transactions for Web applications and Microsoft Windows applications. Applying development-phase assets to optimize production-phase operations, ITCAM can run test scripts created for IBM Rational® Robot and IBM Rational® Robot Tester to assess application performance. While not completely representative of true user experiences, these scripts are nonetheless useful, readily available tools for assessing application performance and detecting performance anomalies. ITCAM's use of them is a good example of cross-domain functionality from a DevOps perspective.

- ITCAM can also run tests with the Rational® Performance Tester, which includes optional support for measuring the performance applications instrumented for Application Response Measurement (ARM), an industry standard for transaction analysis. ARM is especially useful for analyzing complex, custom enterprise applications, including SOA-based applications.

- Through the Transaction Reporter, ITCAM can collect transaction data and store it in the Tivoli Data Warehouse for baselining and ongoing analysis.

When performance problems arise, operators can click on the ITCAM dashboard and drill down to begin root-cause analysis. ITCAM can be configured to automatically open a ticket with appropriate subject matter experts to accelerate the resolution of problems.
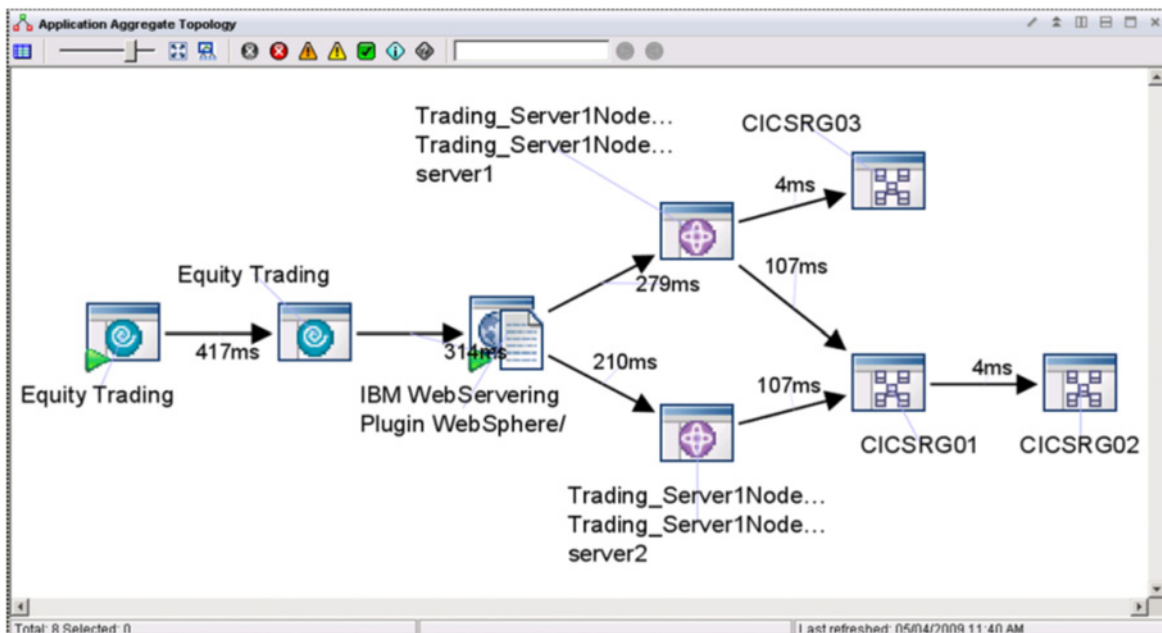
Figure 3: Transaction Tracking Topology from ITCAM highlights key areas of vulnerability across a complex application ecosystem

Predictive Analytics

Having access to insightful analytics when service degradations and outages occur is useful; having access to insightful analytics that can be used to prevent degradations and outages from occurring in the first place is another critical step forward.

For many years, IBM has built up its advanced analytics capabilities through internal development and company acquisitions. In 2008, it introduced predictive analytics in many IBM Tivoli products, including IBM Tivoli Monitoring, IBM Tivoli Composite Application Manager products, IBM Tivoli Business Service Manager, Tivoli Netcool/OMNIbus, and IBM Tivoli Network Manager. These new capabilities leverage IBM's unique strengths in data warehousing, data mining for diagnostics, planning, service optimization, and event management gained through a variety of other well-targeted acquisitions such as Cognos and SPSS.

By analyzing application and network performance over time, building baseline models of application and business service performance, and comparing performance trends to performance thresholds, IBM's Predictive Analytics can predict potential service degradations, SLA violations, and outages. In many cases, the analytics give operations teams 2-5 days advance notice of problems, giving them adequate time to address problems in a methodical way. Operations teams can define alerts that take into account the typical amount of time required to fix a problem. For example, if provisioning new storage requires three days, operations engineers can define an alert that warns about storage capacity problems three days in advance of trending behavior hitting a capacity threshold.

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All this makes SAPM proactive, rather than merely reactive: In some situations, for example, IBM has documented that its predictive analytics capabilities can help triage teams anticipate outages or other problems many days in advance.

Packaging and Pricing

The IBM SAPM solution meets the market requirements for flexible deployments through a variety of form factors and pricing levels. In addition to offering traditional on-premise software licenses, IBM now offers an affordable, scalable SaaS solution, Tivoli Live Monitoring Services, which businesses can deploy quickly with minimal investment. It also offers an appliance solution, IBM Application Manager for Smart Business, which is intended to be a turn-key solution for mid-market customers. IBM SAPM solutions include agents for monitoring Cloud and virtual environments

To simplify licensing, IBM has rolled out a simpler per-core pricing model in the second quarter of 2011.

EMA Perspective

IBM has jumped ahead of most industry competitors by recognizing that business service and applications performance management is at its foundation more of an architectural than a pure product requirement. An effective end-to-end service and application performance design requires advanced capabilities for data gathering, discovery, modeling and reconciliation across many multiple sources, including third-party competitors. To enrich this foundation it has explicitly invested in capabilities for advanced analytics and visualization to support both more effective triage and proactive service optimization and performance enhancements.

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Central to all this is IBM's improved abilities to generate a diverse range of transaction-aware metrics that support both enhanced problem resolution and much improved User Experience Management to better assess the human impacts and business process implications versus purely technical impacts of application delivery. Finally, while its SAPM solution is strongly Operations-centric, IBM has demonstrated a clear recognition of the requirement to support multiple roles in cross-domain service and triage teams, including common data to bring development more effectively into the application triage process. And through TBSM, IBM clearly extends the reach of SAPM to include the broad array of business executives and professionals potentially involved in the rapidly growing requirement to understand application and transaction performance in the context of business outcomes.

This doesn't mean that IBM is done yet. There are nuances of User Experience Management, such as support for browser and mobile devices that remain "to-do's," and IBM's support for network-centric application performance is still very much evolving; however, IBM has a unique combination of analytic technologies, breadth and extensibility of domain awareness, core architectural strengths, and a truly industry-aligned vision that make it stand out as both a leader and a leading innovator in the business service and application performance management marketplace.

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