



Tivoli software

Cost-effectively automate performance management of multitier and service-oriented business applications and services.



December 2005

Middleware is Everywhere **Can you see it?**

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Summary

Deploying a business application no longer means simply adding a new server or logical partition (LPAR) to support a monolithic application for a single group of users. Today, application business logic – which often represents the heart of the business – is diversifying and expanding in ways the original application developers never envisioned. By adopting Web services technologies and leveraging a service oriented architecture (SOA), IT preserves and extends the value of existing technology investments (particularly back office systems) by making both existing and new applications available to more users and in more ways – in response to the changing needs of the business.

As a result, application boundaries migrate across multiple tiers that are linked by messaging fabrics such as message queues, integration brokers and service buses. We call the resulting applications *composite applications* because they are comprised of multiple components that span heterogeneous systems and technologies, such as HTTP, SOAP, J2EE™, databases, application gateways and mainframe (for example, IBM CICS®) systems. Composite applications are at the heart of SOAs, because they form the basis for the loose coupling and modularity that a service orientation advocates.

Because of their widely distributed nature, composite applications are more complex and much more difficult to manage than their predecessors. IT organizations need application management solutions that help manage composite applications from end to end, across multiple system types, and – when necessary – drill down into problem areas to rapidly diagnose and resolve problems. Comprehensive performance management automation solutions require tight integration between application monitoring and software development tools to enable organizations to proactively identify slowdowns, rapidly perform accurate problem diagnosis and help the appropriate staff correct the problem.

Characteristics of a composite application

- Consists of multiple application logic components distributed over multiple run-time and middleware environments.
- Links these components together over multiple transports and interface types.
- Requires a manageable platform that provides visibility into functions such as business process orchestration, virtual platform connectivity and messaging bus integration.
- Services customer transactions.
- Exhibits one or more of the following properties:
 - Multitiered — spans portal, HTTP, J2EE, enterprise application integration, legacy, relational database management systems (RDBMS) and Web services environments.
 - Web-accessible — offers a Web browser-based user interface and leverages J2EE as the key enabling technology.
 - Interacts with legacy or back-office systems (such as CICS, IBM IMS™ and SAP) that act as authoritative data repositories.
 - Relies on business integration middleware such as IBM WebSphere® MQ, IBM WebSphere Message Broker, IBM WebSphere Process Server and other enterprise application integration (EAI) solutions to enable connectivity, mediation, routing and workflow capabilities.
 - Spans corporate organizational boundaries, particularly when deployed using SOAs.

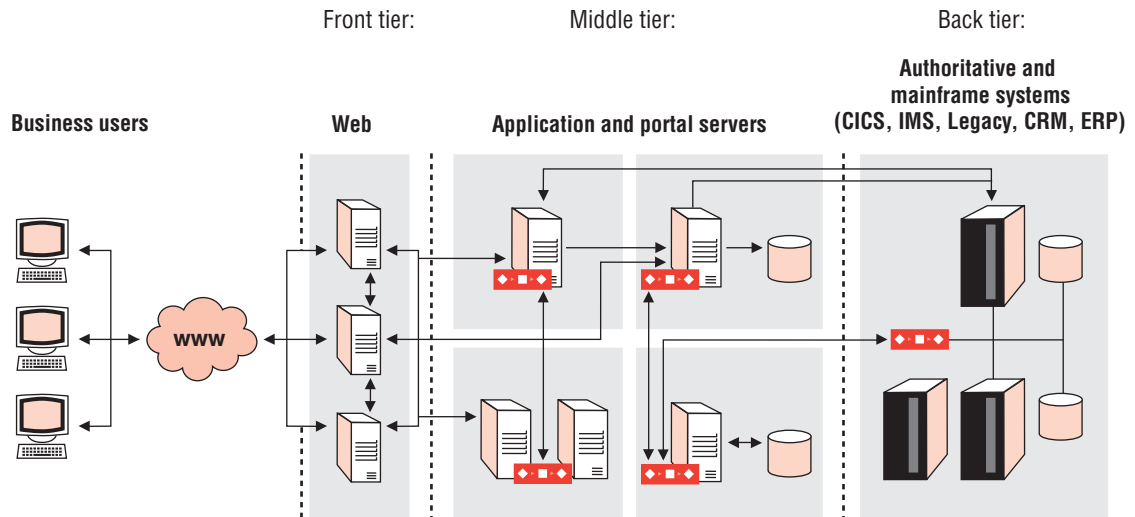
Help address the challenges of managing composite applications

Because composite applications represent an evolution from older applications to meet business needs, they create challenges for IT operations and development staff who must ensure that application performance and availability of the numerous underlying systems meet service level objectives and obligations to line-of-business constituents.

IBM Tivoli® software offers the breadth of application management solutions that an organization must have to manage across a wide spectrum of systems. Customers can purchase individual IBM Tivoli Composite Application Manager (ITCAM) offerings that enable them to tackle their pressing business needs now, then expand into other integrated products as needs change and grow. In summary, ITCAM software enables IT to:

- Visualize any and all business transactions that traverse any pathway through the data center — regardless of the underlying systems and connectivity paradigms.
- Detect and report on any discrete event along the pathway that represents an actual or potential point of degradation or failure.
- Isolate such events to a specific subsystem.
- Leverage integrated diagnostics to drill down into the suspected environment and perform composite application diagnostics.
- Discover, monitor and control services.
- View correlated traces of granular transaction events that span system types — for example, from J2EE to CICS.
- Leverage tight integration with developer desktop tools, such as the Eclipse Integrated Development Environment (IDE), to directly capture production performance data — thereby eliminating the need to recreate the problem in development and testing and reducing the time and effort required to fix problems and redeploy corrected code.
- Consistently execute IT best practices by deploying automation tools throughout the IT life cycle.

Next, let's take a close look at how ITCAM software enables IT organizations to meet their application management needs.



Typical system configuration to support composite applications

Adopt the end user's perspective

The traditional monitoring techniques that focus primarily on measuring the performance of IT resources are ineffective to quickly identify and isolate specific root causes of composite application problems. Why? Because tier-specific tools simply cannot reveal the end-to-end behavior of transactions as they move across tiers. This deficiency underscores the inherent difficulty in proactively managing composite applications when an organization lacks visibility across application boundaries.

Additionally, Web services technologies introduce new layers of abstraction (service orientation and choreography) that need to be managed in context of the service level agreements (SLAs) and objectives.

Highlights

ITCAM software provides the information organizations need to evaluate application performance from the end point to the service topology

How does ITCAM software help? By providing easy-to-install and easy-to-use technology that delivers the right information that organizations require to evaluate application performance from the end point (such as a browser) all the way across the service topology – thereby determining faster and with greater precision the exact source of performance bottlenecks.

Tivoli software delivers all three dimensions of effective application management

Middleware – such as J2EE application servers in general and WebSphere servers in particular, as well as portals that provide the display logic for WebSphere and J2EE environments – is a key enabler of composite applications because it instantiates the core linkages across IT transactional systems and environments. Business logic implemented in J2EE conducts transactions and workflow between multiple business systems by interacting with remote data and logic from various sources across the enterprise.

Tivoli composite application management tools address all three dimensions of effective application management:

1. Services and transaction response time tracking — from end to end and across multiple system types, to quickly isolate problems within a particular run-time environment

Because an end user's experience of an application depends entirely on the performance of underlying transactions as they flow between application tiers, this view tracks services and transactions throughout the entire composite application flow. By analyzing response time at the client and correlating this with the contribution of each system within the topology, this view enables an organization to adopt the end-user perspective.

2. Composite application diagnostics — deep-dive diagnostics and correlation within suspected subsystems to analyze and resolve the root causes of problems

This view enables the subject-matter expert to drill down and decompose the transaction itself to examine the state and behavior of the code as it executes – in test or production. The expert can then make use of these deeper views to correlate the application state with the performance of tightly coupled systems, such as a database or back-office host. This process often reveals the source of the performance problem and helps minimize the time to repair it.

3. Resource monitoring — tracking both the infrastructure and resource consumption that result from application load

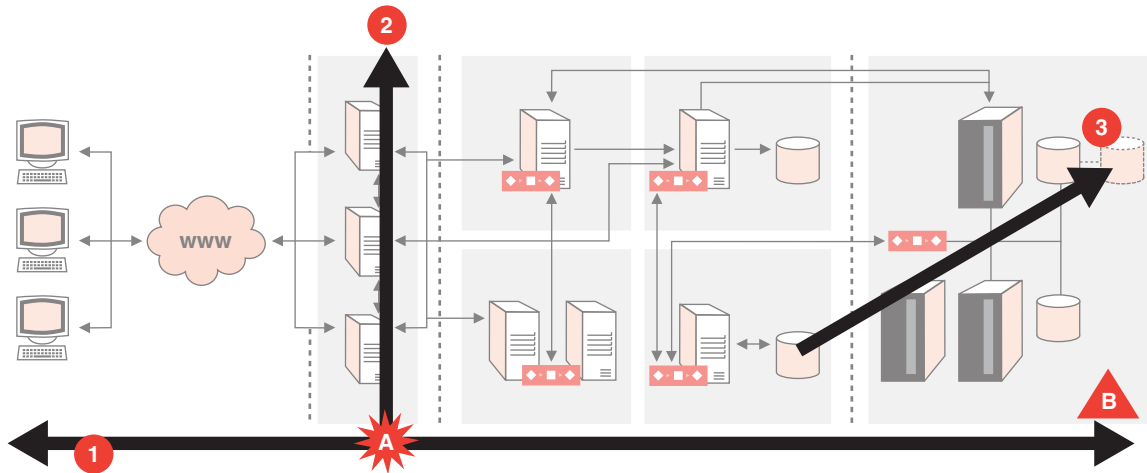
This view is pervasive – across all systems in support of each application runtime partition – to enable an organization to view the health of the underlying infrastructure, which is critical to composite application performance and availability.

The following subsections describe ITCAM capabilities in these areas in greater detail.

Services and transaction response time tracking

Organizations derive substantial value from ITCAM software because it provides the breadth of coverage needed to track and help optimize transactions from end to end, across mixed-vendor environments that consist of distributed and mainframe platforms and their subsystems (including J2EE, CICS, WebSphere MQ, WebSphere Message Broker and IMS). ITCAM software helps IT staff measure performance from the end user’s perspective both by monitoring individual transactions as they occur and by tracking synthetically generated transactions that simulate actual business processes. Harnessing the information collected, administrators gain complete visibility into how long each step takes as it traverses enterprise systems.

Three dimensions of effective application management



A complete application management solution encompasses integrated tools to address three dimensions:

1. Services and transaction response time tracking from end to end
2. Composite application diagnostics when problems occur **(A)**
3. Resource monitoring, such as for proactively addressing potential problems when resources become overburdened **(B)**

Furthermore, Tivoli composite application management software enables customers to monitor, manage and control the services layer of their SOA implementation. Significant benefits can be achieved from a management solution that recognizes Web services and the SOA infrastructure as first-class objects – rather than only managing components and resources that are used in an SOA context. As organizations move toward service orientation of their applications, managing the service *characteristics* will need to become a core competency to comply with SLAs.

Composite application diagnostics

Because composite applications are by nature distributed, the problems they exhibit typically don't have obvious root causes. Instead, fault conditions are

Highlights

ITCAM software enables organizations to perform advanced, deep-dive analysis and facilitate rapid problem resolution

usually buried and masked by other symptoms. To effectively manage the performance and availability of composite applications, as well as comply with SLAs, organizations should implement solutions that deliver composite application diagnostics to quickly identify, isolate and then resolve the problem. ITCAM software enables the organizations responsible for different phases of problem diagnosis to work together to remedy problems quickly.

When drilling down to granular transaction levels, ITCAM software enables an organization to perform advanced, deep-dive analysis – and facilitate rapid problem resolution – in both mainframe J2EE/CICS/IMS and distributed J2EE environments. Even administrators who are not familiar with an application’s structure can use method-level diagnostics to identify a code problem and pass it on to the appropriate application architect or developer. On a single screen, administrators can view individual transactions (instance-level data) from multiple managed servers to pinpoint the exact point within the transaction flow where the problem occurred. ITCAM software displays:

- Transaction instances that accumulate resident Java™ Virtual Machine (JVM) time with the ability to see deeply into the state of the application and its environment — all in real time and without instrumentation.
- Complete views of transactions that span from Web services to J2EE to legacy back-end systems, including fully correlated traces of execution steps within CICS and IMS environments — drawing on advanced native transaction collection agents within these middleware systems.
- Powerful memory diagnostics with tools that help IT staff quickly spot memory leaks and then determine the specific Java classes responsible.
- Historical trends with deep-dive analytical views that can be decomposed by application, transaction and server — down to CPU and elapsed time consumption per method invocation.
- Detailed information about suspected servers and coupled systems that enable composite applications.

As a result, administrators don't have to spend time wading through simplistic "red-light/green-light" indicators or server-by-server menu trees to begin the problem diagnosis process. Such an approach does not scale when administrators monitor the large numbers of systems (such as distributed clusters connected to mainframes and other systems) that are common to most data centers. In contrast, Tivoli composite application management software groups logical systems together by business function – for example, those that support an inventory control system – then summarizes the performance of the systems as a whole. If and when performance delays begin to appear, easy-to-use tools enable administrators to quickly drill down to one or more affected servers in the group. These tools help administrators isolate probable causes and attribute them to, for example, constrained resources or specific transaction anomalies within the managed application.

Resource monitoring

ITCAM software enables an organization to perform comprehensive resource monitoring of the critical systems that support composite applications, such as IBM WebSphere Application Server, IBM WebSphere Portal, WebSphere MQ, WebSphere Message Broker and IBM WebSphere InterChange Server, as well as CICS, IMS and data-center infrastructure.

ITCAM software provides three sets of resource monitoring capabilities to help an organization proactively prevent problems before they affect users:

1. Identify response time and availability problems proactively.

Using ITCAM software, organizations monitor the results of typical end-user transactions that are synthetically generated by a robot. Transactions are run as a set of discrete steps, each of which forms a part of the end-user business process. Because it monitors the successful completion of the transactions,

Highlights

ITCAM software issues alerts before problems become critical

and the time that each takes, the robot can send alerts about problems that end users might have – enabling organizations to implement fixes before end users experience the problems or need to call the help desk.

Additionally, the software monitors the performance of real end users. If live-traffic response times begin to trend toward service level violations, ITCAM software can issue alerts before problems become critical.

2. Isolate the source of the problem quickly.

Tivoli composite application management software helps an organization isolate problems by tracking response times across systems and understanding how each system contributes to the overall end-user response time. An automated discovery process dynamically detects all transaction paths and automatically sets threshold values based on performance metrics observed in the production environment. When a threshold is exceeded, the software issues an alert and passes diagnostic data to a business health console that administrators use to visualize performance trends. The visual display helps reveal the system that is the likely cause of the problem.

3. Provide information to other IT staff to help correct the problem.

After the software alerts the appropriate support personnel for a problem area, they can begin to remedy the problem immediately – because the context is preserved as they move between different views of the data. When a problem is detected and isolated, users in different support roles can easily switch perspectives. For example, an application support group can initiate the drill-down process without having to start from scratch. During the problem triage process, the IT staff saves time, effort and resources – and can readily maintain service levels.

Ultimately, ITCAM software enables the data-center operations staff to perform and automate a number of critical resource management tasks:

- Help optimize WebSphere MQ configuration:
 - To enable administrators to manage configurations for WebSphere MQ queue managers from a central point of control, ITCAM software collects configuration information into a central repository, enabling a smooth deployment and current backup for continuity planning.
 - Integrated prototyping and automatic propagation features enable multiple, distributed queue managers across multiple systems to maintain identical configurations by matching changes made to a model.
- Measure composite application performance over message brokers and channels:
 - ITCAM software compares message arrival and departure rates for application queues to help an organization measure throughput and predict system behavior under different load profiles.
 - By visualizing trends in these rates, IT can accurately quantify scaling requirements for future demand.
- Monitor composite application resource metrics across different views:
 - Tivoli composite application management software preserves important problem context information, such as server, process and application state.
 - Leveraging the software's high degree of integration, subject-matter experts can launch diagnostics cockpits in context when moving from resource monitors to deep-dive transaction views and even to portal-based views of correlated performance metrics derived from CICS and IMS environments.
- Fine-tune WebSphere Message Broker performance — ITCAM software:
 - Monitors message broker availability and if necessary, automatically restarts it.
 - Tracks the frequency and timing of message flows within the broker to identify changes in the way message flows are executed and helps meet SLAs.
 - Obtains accurate baselines for broker performance during testing of new message brokers to help address offending message flows before they are put into production.
- Monitor the WebSphere InterChange Server — accurately track any defined collaborations to obtain early warnings before problems affect business applications.
- Discover and monitor Web services across BEA WebLogic, IBM WebSphere and Microsoft® .NET applications.

Highlights

By delivering supplied and customized situations, ITCAM software enables organizations to detect and repair problems as they happen

ITCAM software includes both supplied and customizable situations that organizations can use to help detect and repair problems as they happen. Users can leverage customized displays of the information that are most relevant to them, including business, platform and resource views.

Integrate operations with application development and testing

Integrating ITCAM software with the IBM Rational® Software Development Platform enables information flow between production, testing and development teams – and drives the quality of its applications to higher levels. Developers can now leverage production application information to analyze and help fix the root causes of problems, including those that are difficult or impossible to reproduce in testing – particularly those based on SOA.

How does this work? Tivoli products expose performance data captured from live production applications directly to Eclipse-based Rational test and development tools, enabling application developers to see exactly where in the source code problems reside. The Rational IDE enables the programmer to quickly check out all dependent code libraries and associated files from the source tree, then jump directly to the line-of-business logic in need of repair.

To facilitate the development of Web services, early application life-cycle users such as services architects and integration specialists can view production and test service topologies, patterns and flows with IBM Web Services Navigator. This feature is a plug-in to the same Rational and Eclipse tools that are already commonly used by developers.

Highlights

Tivoli IT Service Management provides process-oriented solutions, best practices and implementation services to address customer priorities, pains and requirements

Standardize on services management and delivery

Businesses are turning to best practices such as Information Technology Infrastructure Library (ITIL) because they help companies align IT to the business. IBM – by augmenting ITIL and concentrating on how to turn standards into practices that can truly be implemented – has undertaken its IBM Tivoli IT Service Management initiative. Tivoli IT Service Management seeks to help customers:

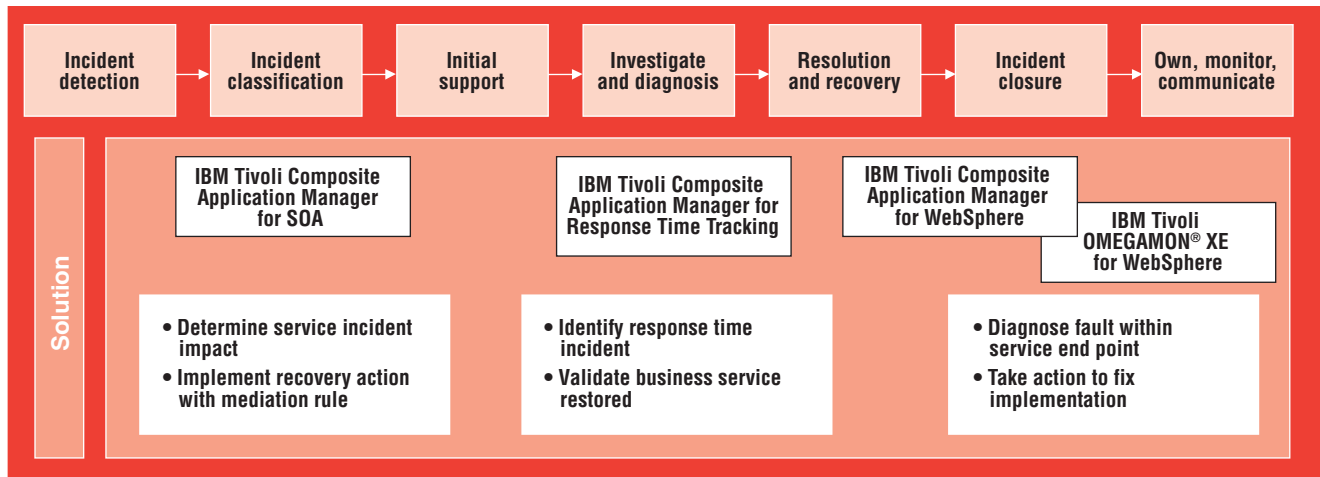
- Align IT services with the current and future needs of the business and its customers.
- Optimize the quality of the IT services delivered.
- Minimize the long-term cost of provisioning services.

Tivoli IT Service Management delivers on these objectives by providing process-oriented solutions, best practices and implementation services to address customer priorities, pains and requirements.

Tivoli composite application management software supports service delivery because it helps an organization:

- Obtain performance and availability data from the end-user perspective.
- Identify performance and availability problems before service levels are breached, using real-time reporting and alerts.
- Feed data to Tivoli service level management tools to facilitate service level reporting.
- Perform historical reporting through the data warehouses, and thereby support forecasting of system capacity.

ITCAM software supports a number of Tivoli IT Service Management processes. Through its reporting and automation capabilities, it helps organizations implement efficient, best practice-based processes for incident management, problem management, change management, availability management, capacity management and release management.



One example of how Tivoli composite application management software supports Tivoli IT Service Management processes. The software facilitates incident management by helping restore normal service operation rapidly.

Conclusion

IBM Tivoli composite application management software helps organizations address all three dimensions of effective application management: services and transaction response time tracking, composite application diagnostics and resource monitoring. With ITCAM software, an organization can:

- Track individual services and transactions from end to end, and across multiple system types.
- Quickly isolate problems — often before they impact end users.
- Leverage deep-dive diagnostics and correlation across subsystems to locate and resolve the root causes of problems.
- Monitor application servers and resource consumption to proactively prevent problems.

Individual ITCAM products not only help organizations address their most pressing application management needs now. As an organization is ready to expand into other areas, the products integrate with one another to support broader initiatives with substantial business value. ITCAM software supports the optimization of application development, the deployment of standards-based IBM Tivoli IT Service Management and the implementation of an SOA.

For more information

To learn more about IBM Tivoli composite application management software, contact your IBM representative or IBM Business Partner, or visit ibm.com/tivoli



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