



| IBM Software Group

IBM Tivoli Composite Application Management

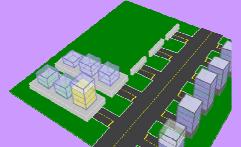
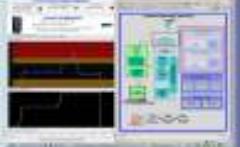
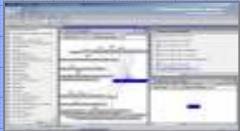
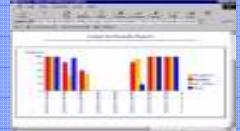
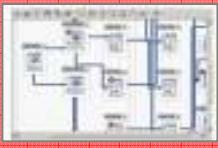
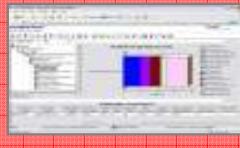
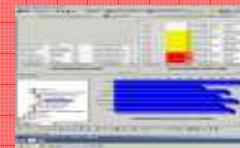
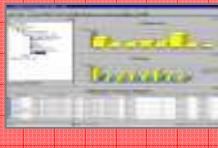
Technical Overview

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Tivoli Automation Portfolio

Orchestration And Provisioning	IBM Tivoli Provisioning Manager			IBM Tivoli Intelligent Orchestrator		IBM Tivoli Configuration Manager		
Business Service Management	IBM Tivoli Business Systems Manager			IBM Tivoli Service Level Advisor				
Event Correlation and Automation	IBM Tivoli System Automation Family			IBM Tivoli Netcool Family		IBM Tivoli Enterprise Console		
Composite Application Management	ITCAM for RTT		ITCAM for WebSphere / J2EE Operations		ITCAM for SOA		IBM Omegamon for Messaging	
Resource Monitoring		Distributed Systems				zSeries Systems		
		IBM Tivoli Monitoring Family				IBM Tivoli OMEGAMON Monitoring Family		



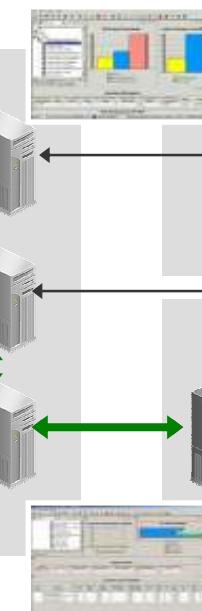
4 Principles Of Application Management

A repeatable approach to sense and respond to performance problems within the composite application infrastructure.

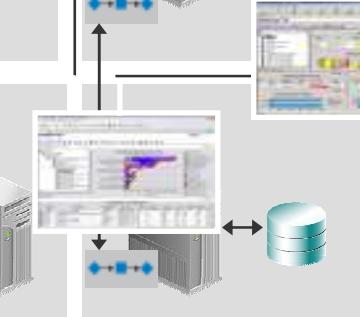
Monitor Response Time and Availability



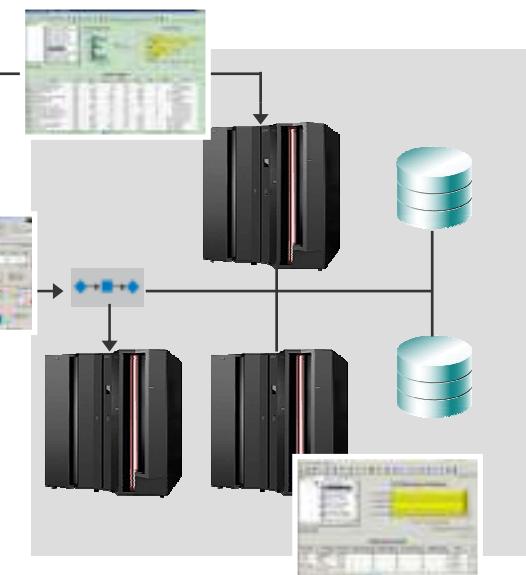
Mediate Services & Enforce Policies



Trace Transactions & diagnose problems

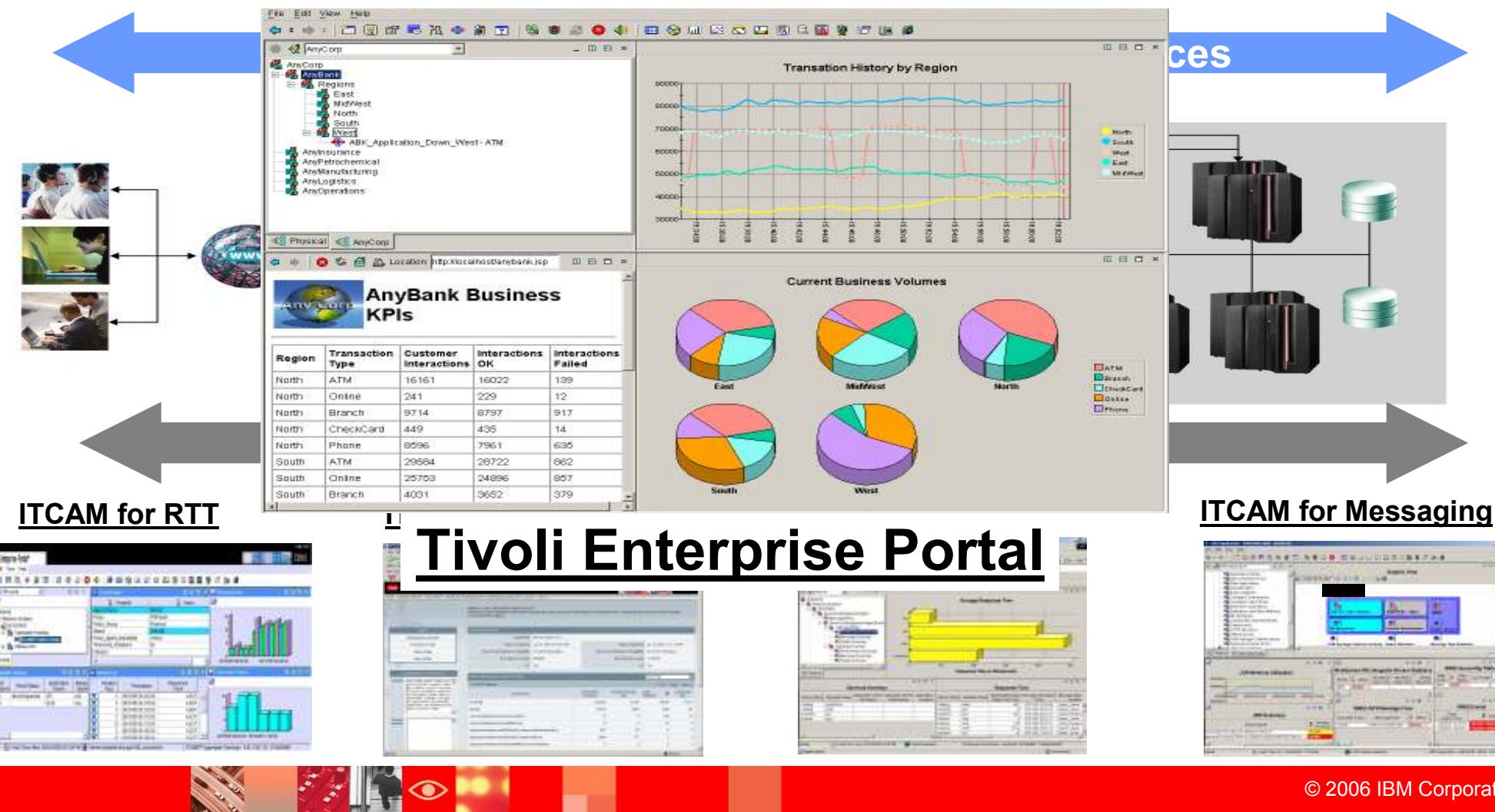


Monitor & Adjust Resources



The ITCAM Solution Portfolio

Delivering high-performing composite applications.





IT CAM for Response Time Tracking

Tivoli software

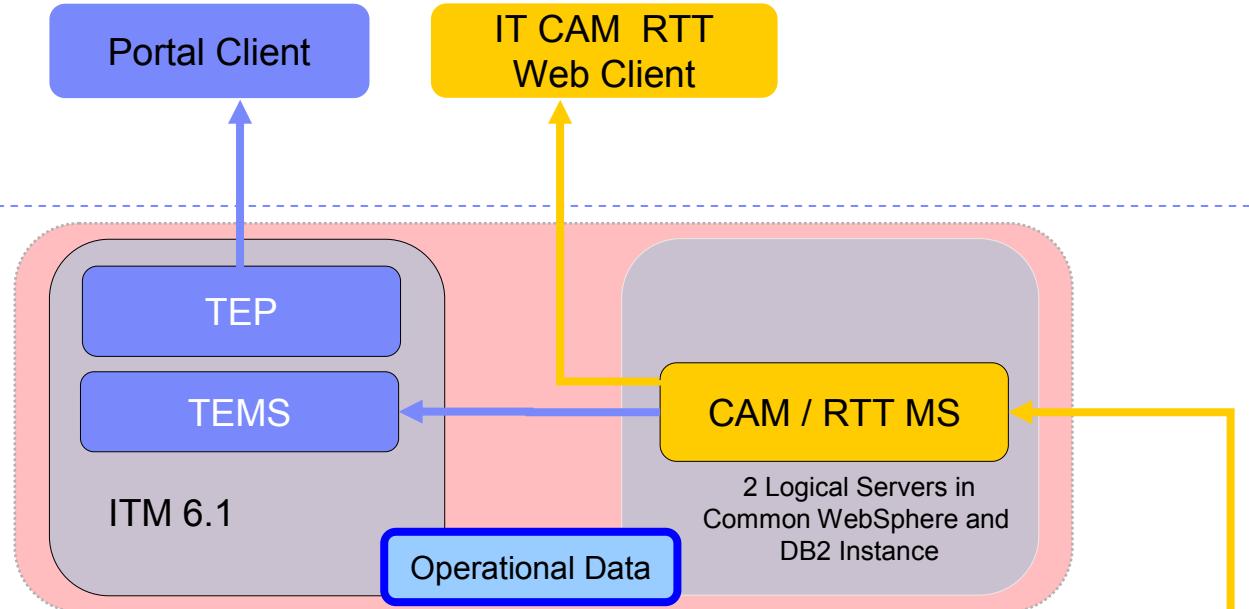


High Level CAM Logical Architecture Diagram

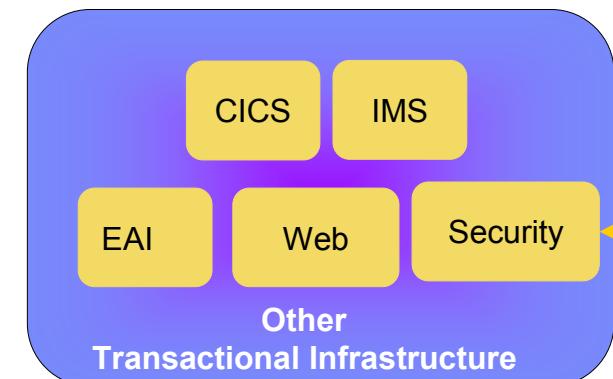
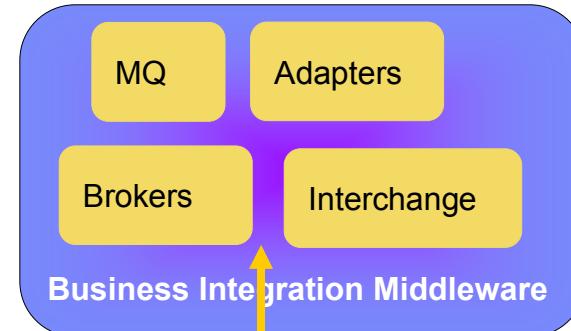
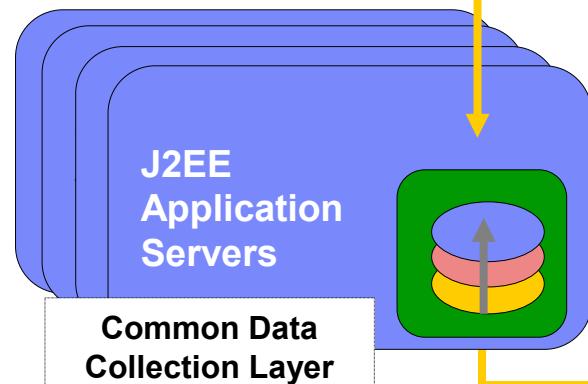
Display



Managing Servers



Data Collection



Diagnostics Data

What does ITCAM for RTT do?

1. Robotic Transactions

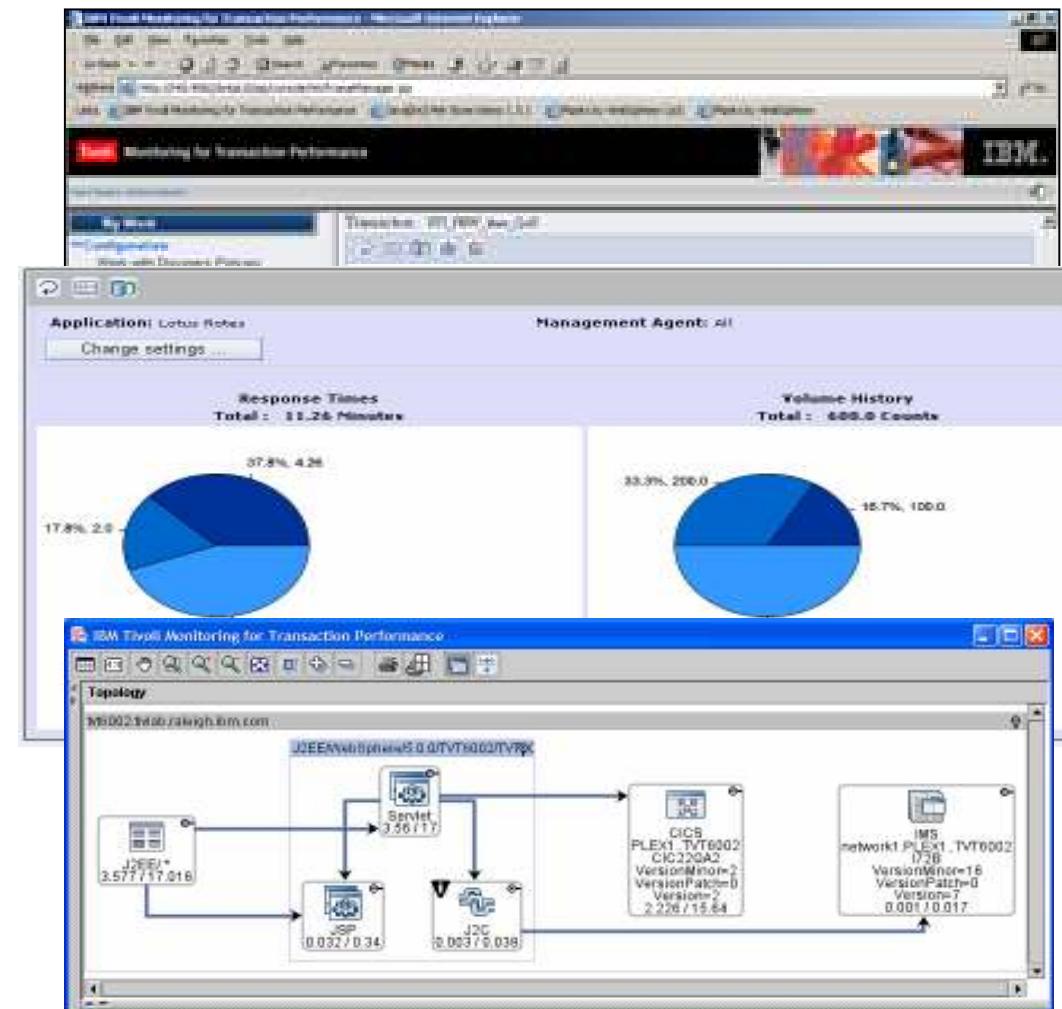
- ▶ Playback of end-user transactions
- ▶ Single user or high-volume simulation
- ▶ Leverages Rational Robot technology

2. Real End-User Response Time

- ▶ Client Application Tracker
- ▶ Web or client server apps
- ▶ Useful for isolating sporadic problems

3. Transaction Tracking

- ▶ Auto-discovery, threshold setting
- ▶ ARM JITI of J2EE environment, no code instrumentation
- ▶ Transaction correlation
- ▶ Now tracks to CICS and IMS



Robotic Transactions

Performance and availability of a complete business process

- **Records a complete business process** which is played back from various agents
 - ▶ Examples: buying a book, filling out an insurance claim
 - ▶ Shows performance and availability for each step
 - ▶ Useful for testing different locations (both inside and outside the firewall)
 - ▶ Proactively find problems before your users do
 - ▶ Works with browser and Windows application traffic
- **GUI based simulation – Robot GUI**
 - ▶ Records and plays back at the GUI layer
 - ▶ Interact as a real end user would
- **High scale simulation – Robot VU**
 - ▶ Good for checking a large number of web sites frequently



Marking the Transactions in the Robot Script

```
'Script Name: SameTime2
StartBrowser "http://w3.ibm.com/e-meetings/webconferences/", "WindowTag=WEBBrowser"

Window SetContext, "WindowTag=WEBBrowser", ""
Window WMaximize, "", ""

Browser NewPage,"HTMLTitle=IBM Collaboration", ""
EditBox Click, "Name=j_username", "Coords=22,9"
```

①



②



③ Timer inserted

```
'Script Name: SameTime2
StartBrowser "http://w3.ibm.com/e-meetings/webconferences/", "I

Window SetContext, "WindowTag=WEBBrowser", ""
Window WMaximize, "", ""

StartTimer "Click_TestConnectivity" | I

Browser NewPage,"HTMLTitle=Web conferences | Home page", ""
HTMLLink Click, "HTMLText=test your connectivity", ""

Window SetContext, "WindowTag=WEBBrowser", ""
```

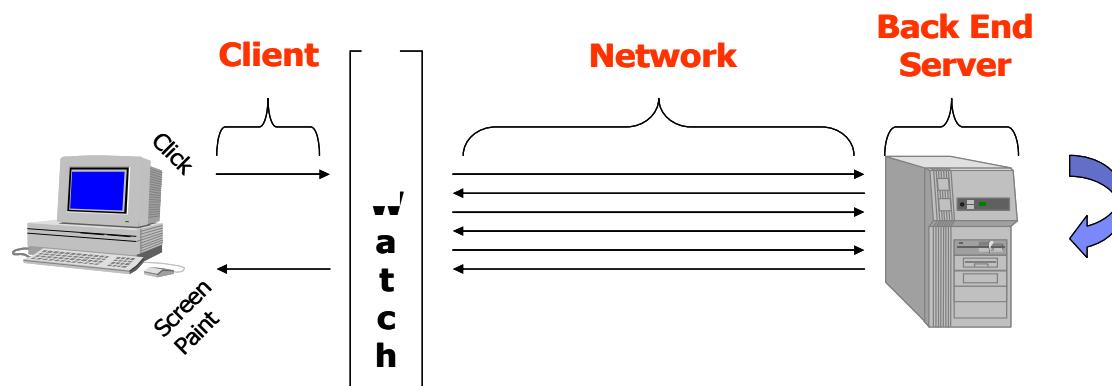
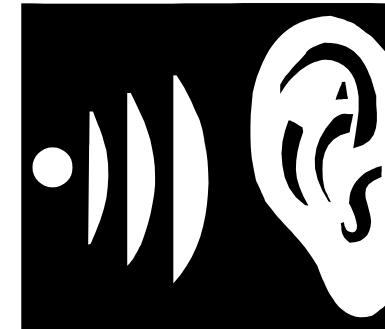


Client Application Tracker (CAT)

Client based Response Time Monitoring

Real end user response times

- Agent deployed to end user, Windows-based desktop
- **Behavior modules** describe what data to collect



- **Client Time**
 - **Network Time**
 - **Server Time**
- Processing time spent on the client**
Client to Back End Server and back
Total Back End Application Time

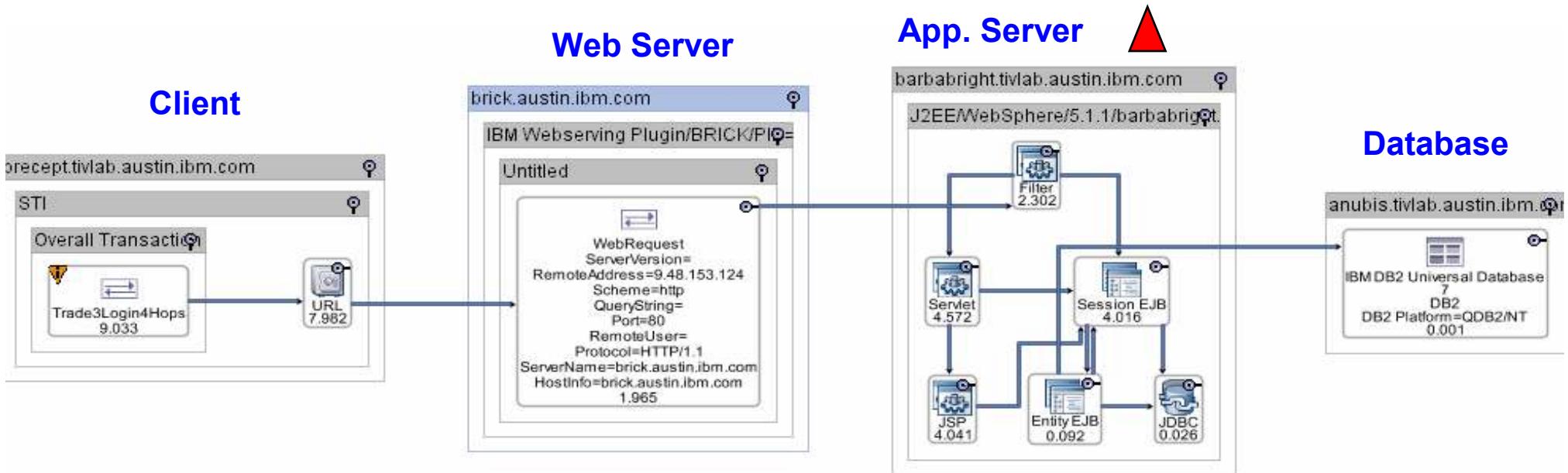
Metrics collected

- **Total Response Time**
- **Segmented Response Time**
- **Browse Time**
- **Workstation Hostname**
- **Application Name**
- **Transaction Name**
- **Application Destination IP Address**
- **IP Packet Size**

Transaction Topology Diagram Makes it Easy to Assign the Trouble Ticket

Auto discovery and threshold setting

Problems are automatically identified by finding resources that are performing differently than normal

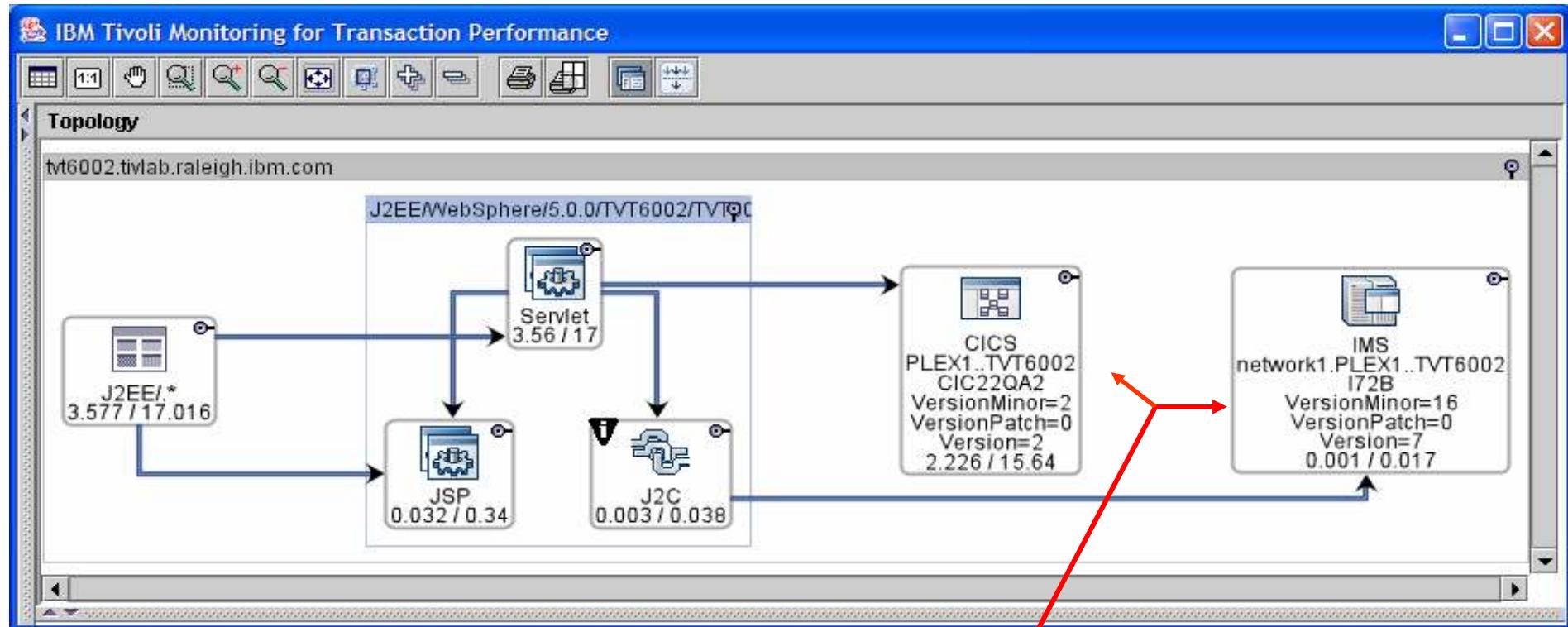


Identify problem system with RTT, drill down with ITCAM for WebSphere

Track Response Times into CICS and IMS

Backend Systems Support

- DB2 ARM instrumentation
- JCA/J2C in J2EE environment (including CICS, IMS, SAP)



Follow transactions into CICS and IMS

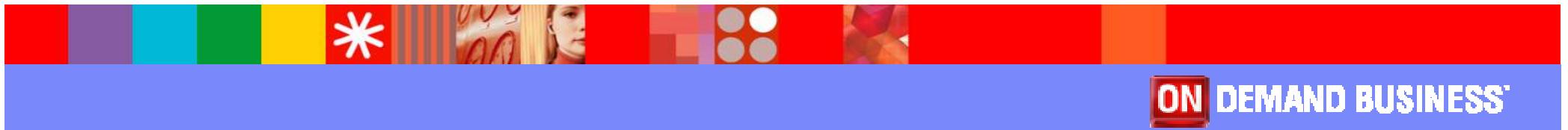
Application Response Measurement (ARM) Data

- Transaction response via **ARM-instrumented** applications
 - ▶ Robot and CAT generate ARM data records
 - ▶ J2EE applications deployed on WebSphere and WebLogic can use RTT's **J2EE component** to insert ARM records just in time (JITI)
 - ▶ ARM data generated by CICS and IMS agents
- API consisting of calls to identify transactions, then, start and stop timers
 - ▶ Start and stop calls placed around business logic to provide a single response time of a unit of work (LookupUser, CheckoutUser, etc)
- Provides **ability to correlate transactions**
 - ▶ Generate and pass correlator at transaction edge (beginning)
 - ▶ Maintains response time and call order
 - Parent (Edge) → Child 1 → Child 2 → Child n
 - Child 1 is Child 2's parent, etc.
- Current standard is ARM 4.0 Version2



IT CAM for RTT: User Interfaces

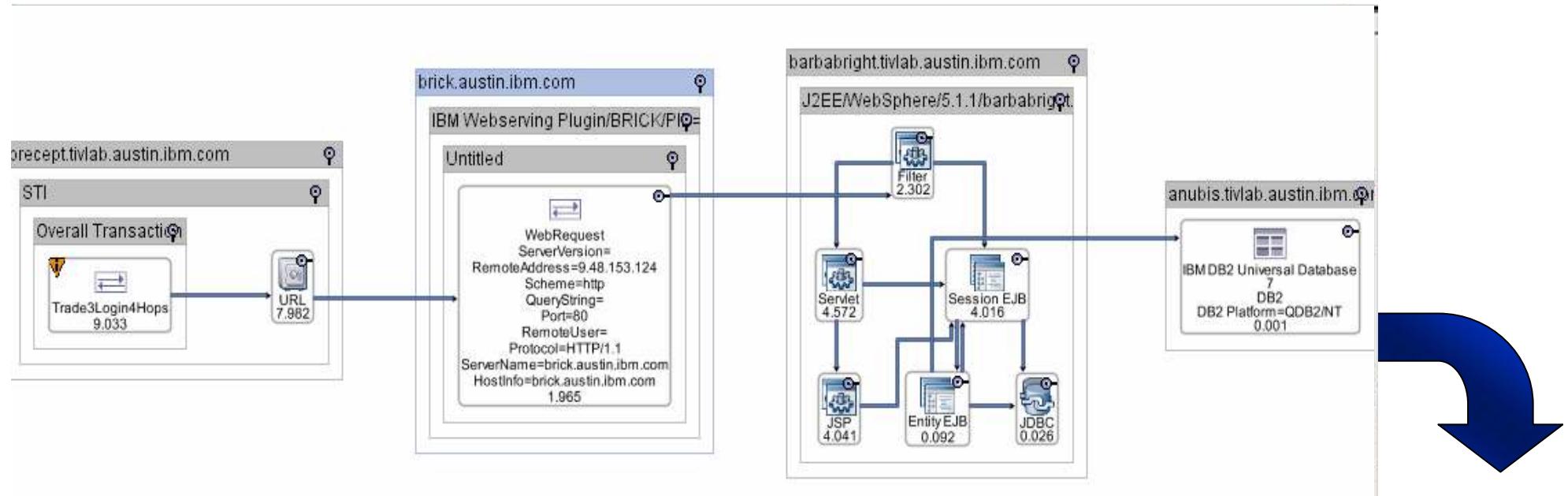
Tivoli software



ITCAM for RTT: User Interfaces

- **Level 1-2 Support**, Service Level Management (ITIL definition)
 - ▶ Configure/View synthetic transactions (record and playback)
 - ▶ Configure/View real end-user response values
 - ▶ Configure/Discover/View transaction topology with response times for each component
 - ▶ Isolate failing/slow component response for functional escalation
 - ▶ Provide data to support Availability Management and Performance Management
- **Operations**
 - ▶ *Tivoli Enterprise Portal* interface
 - ▶ Specific, operations-focused workspaces
 - Transaction Tracking, Policy Groups, Policy Status, Agent Status, Aggregate Topology, Instance Topology

Dashboard Quickly Shows Availability and Response Time Status



Page 1 of 1 1 [It's g](#)

Dashboard shows transactions with a availability or response time problem

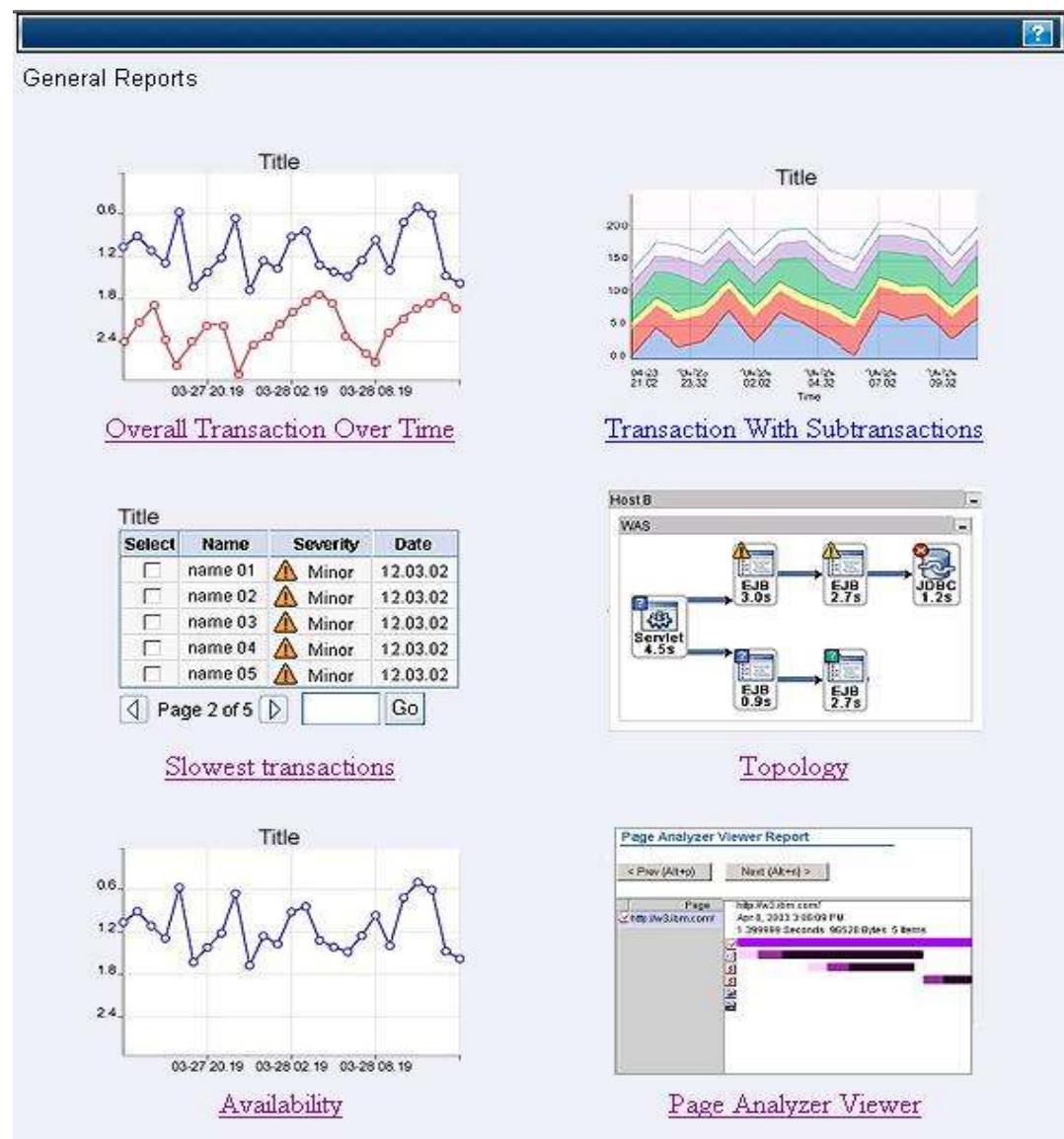
Click to see response time trend



General Reports

Provides an entry point into reporting not through the big board so that Policies that are no longer active may have their data viewed.

- **Overall Transaction over time-** line chart of endpoint(s) data plotted over time
- **Transaction with Subtransaction-** stacked area graph of subtransactions compared against each other and their parent over time
- **Slowest transactions-** table provided the slowest root transactions in the system
- **Topology-** provides topologies for all policies active or not
- **Availability-** health of a Policy over time
- **Page Analyzer Viewer-** breakdown of the STI transactions data





Tivoli Enterprise Portal Integration

Tivoli software



High Level CAM Logical Architecture Diagram

Display



Managing Servers

Portal Client

IT CAM RTT Web Client

TEP

TEMS

ITM 6.1

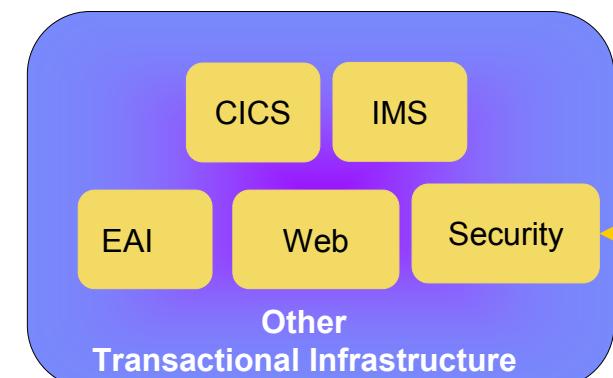
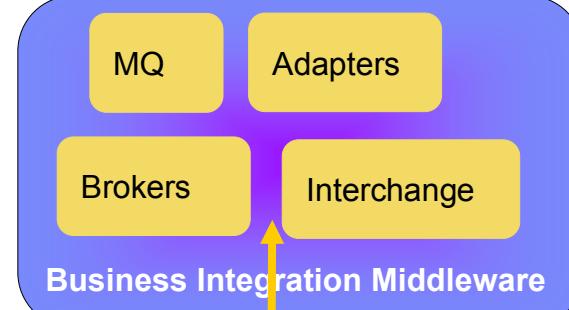
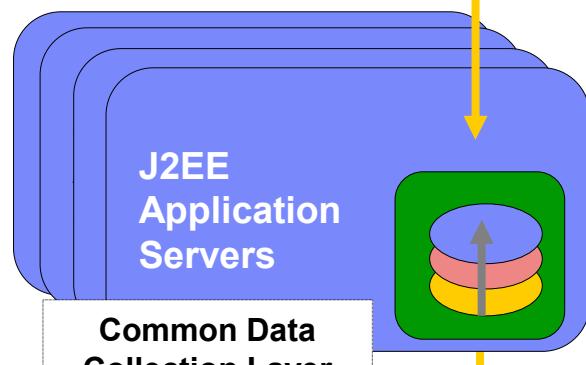
TEMA

CAM / RTT MS

2 Logical Servers in
Common WebSphere and
DB2 Instance

Operational Data

Data Collection



Diagnostics Data

Integrated TEP Workspace Views

File Edit View Help

View: Physical

Violating Policies

Agent Availability

Enterprise

- Linux Systems
- Windows Systems
 - BEIJING
 - KHARTOUM
 - Response Time Tracking
 - SALEM
 - VIENNA

Physical

Violating Policies

Count

ITSO_all
Trader_Web_app
Trader_J2EE_app

Percent

IMS_CICS
All_STI
ITSO_all
Trader_Web_app
Trader_J2EE_app

Policy Groups Summary

Policy Group Name	Status	Agent Availability (%)	Availability Violation Events	Performance Violation Events	Threshold Violations	Failures	Total Transactions	Violating Policies	T Po
Trader_J2EE_app	Warning	100	0	1	1	2	3	1	
Trader_Web_app	Warning	100	0	1	1	2	3	1	
ITSO_all	Warning	100	0	5	4	2	140	1	
All_STI	Normal	100	0	4	3	0	137	0	
IMS_CICS	Normal	100	0	0				0	

Hub Time: Fri, 11/11/2005 11:03 AM Server Available Response Time Agent Policy Groups - beijing - SYSADMIN



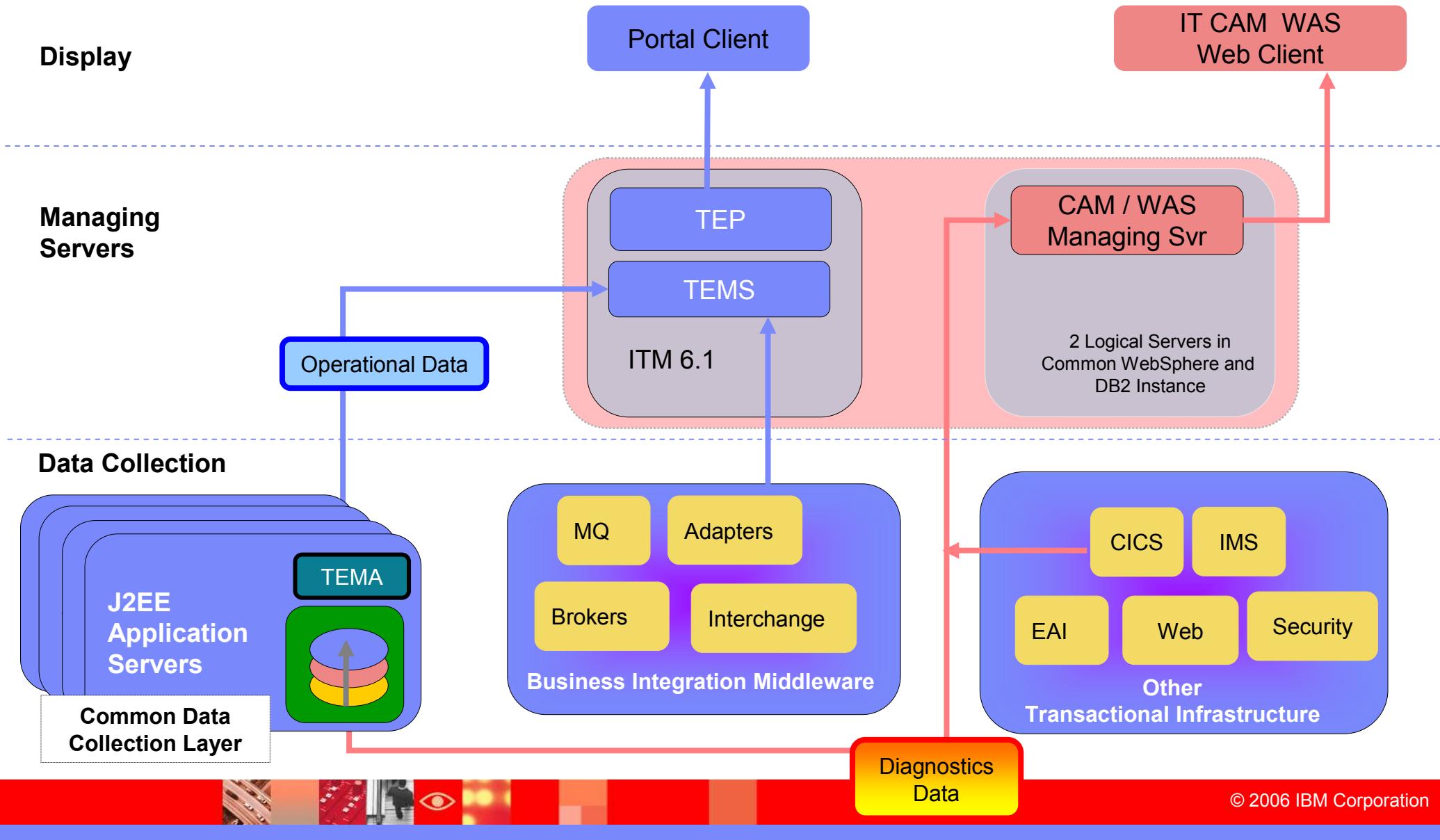
IT CAM for WebSphere

Tivoli software



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High Level CAM Logical Architecture Diagram



IBM Tivoli Composite Application Manager for WebSphere

ITCAM for WebSphere Maximizes J2EE Application Performance

1. Reduced cost to find application downtime/slow downs

- ▶ **Deep diagnostics** across Portal, J2EE, CICS, and IMS for an application profile of performance.
- ▶ Define and **change level of diagnostics at run-time** without interrupting service to the end user

2. Improved performance and availability by automating business processes

- ▶ **Custom alerts** based on metrics across resources.
- ▶ “Take Action” **automatic response**
- ▶ Low-overhead reports analyzing trends to proactively detect problematic situations.

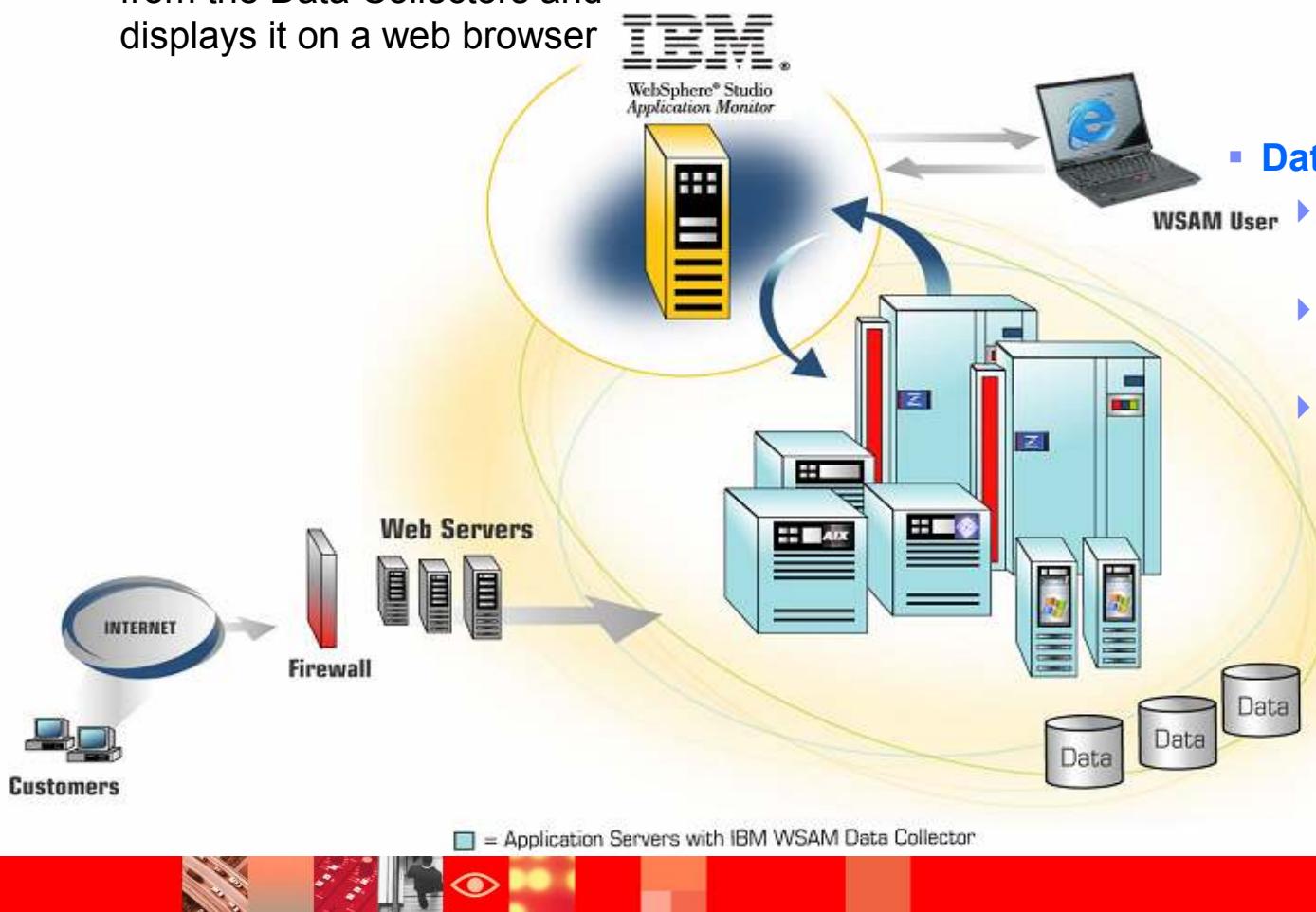
3. Improved organizational productivity

- ▶ Navigate in context to appropriate view from ITCAM for RTT in order to quickly analyze the poor performing resource in question.
- ▶ Deliver run-time performance data to Rational IPOT to diagnose production problems in a test.
- ▶ Provide deep diagnostics to the TEP to provide holistic view.

IT CAM for WebSphere - Conceptual Overview

▪ Managing Server

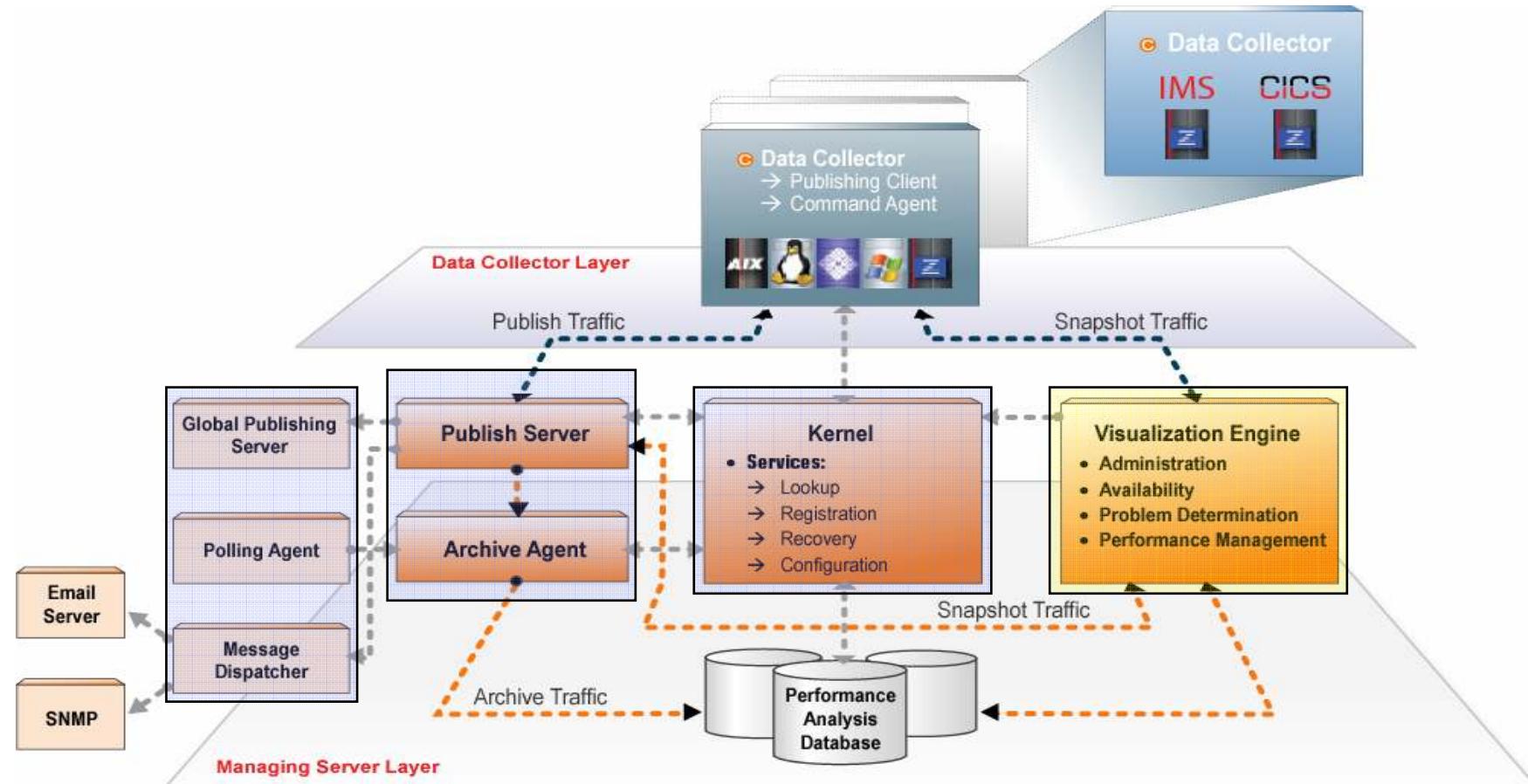
- ▶ Collects, correlates and processes the information from the Data Collectors and displays it on a web browser



▪ Data Collectors

- ▶ Installed on the servers to be monitored (WAS, CICS, IMS)
- ▶ Collect application information
- ▶ Send information back to the Managing Server

Data Collector & Managing Server Architecture



Data Collector – Sources of Information

IT CAM for WebSphere collects information from numerous sources and presents this information throughout the product

- **JVMPPI** GC Data, Method trace, stack trace, CPU Time
- **JVMMI** heap dump
- **JMX** System resources
- **SMF** System resources
- **PMI** System Resources
- **BCM** Byte Code Modification (application classes)
- **OS** Services SCC, Platform CPU, Environment

Monitoring on Demand™

- Features/Information available at different levels
 - ▶ Common to all Levels
 - Availability Management, System Resources
 - ▶ **L1:** Request
 - CPU information
 - Elapsed time
 - ▶ **L2:** Component (JDBC/SQL, EJB, CICS, RMI)
 - L1 information for Component
 - ▶ **L3:** Java Method (Entry/Exit)
 - L2 information for Java methods
 - Certain Traps & Alerts need L3 to capture Method trace

IT CAM for WebSphere: User Interfaces

- **J2EE Application Administrator**
 - ▶ Browser-based GUI
 - ▶ Subject Matter Expert (SME)
 - ▶ Understands concepts of memory management, method tracing, lock contention, etc
- **Operations**
 - ▶ Tivoli Enterprise Portal interface
 - ▶ Specific, operations-focused workspaces:
 - WebSphere Agent, WebSphere App Server, Request Analysis, Garbage Collection Analysis, Log Analysis, Pool Analysis, Data-Sources, JMS Summary, Web Applications, EJB Containers, DB Connection Pools, J2C Connection Pools, Thread Pools, Cache Analysis, Workload Management



Web-based User Interface for SME

Tivoli software



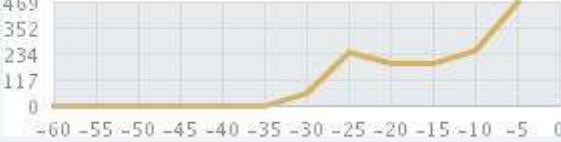
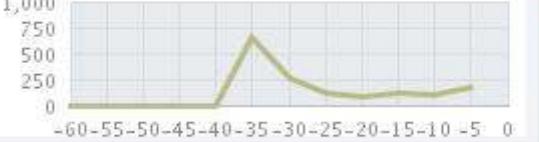
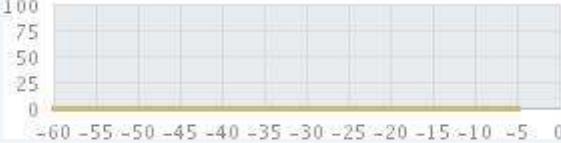
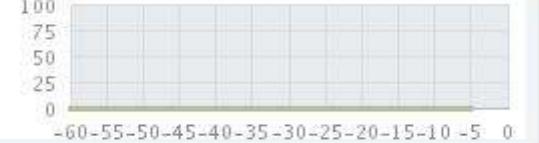
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Systems Overview – Enterprise

Enterprise Group Server Portal Web Set as My Default Page

SERVER GROUPS 4 Per Page ▾

1 - 4 of 9 Results 1 2 3 Next>

Name	Available Servers	Disabled Servers	Unavailable Servers	Total Volume (Last Hour)	Throughput (Requests/min, Last Hour)	Response Time (ms, Last Hour)
● AIX Cluster	1	0	1	6448		
● CICS22M1	0	0	3	0		

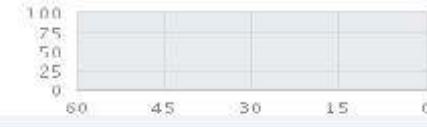
System Overview – Group

- Group
 - ▶ Shows all servers in group, active or not
 - ▶ Response time & Throughput graphs (last hour)

Enterprise Group Server Portal Web Set as My Default Page

SERVERS in AIX Cluster

1 - 2 of 2 Results

Name	Status	Total Volume (Last Hour)	Throughput (Requests/min, Last Hour)	Response Time (ms, Last Hour)
qaapp-aix-s01_node.server1.92992 (L3)	Available	10054		
qaapp-aix-s03_node.server3.40288 (L2)	Available	0		

1 - 2 of 2 Results

System Overview – Server

Enterprise Group Server Portal Web Set as My Default Page

SERVER SELECTION

Group: AIX Cluster Server: qaapp-aix-s01_node.server1.92992 [L3]

SERVER INFORMATION

Server Name	qaapp-aix-s01_node.server1 (L3)
Group Name	AIX Cluster
Platform	AIX
IP Address	192.168.4.8
Start Time	September 14, 2004 6:33:25 PM PDT
Monitoring Level	L3

ACTIVITY (Last Hour)

Response Time (ms, Last hour)

Throughput (Requests/min, Last hour)

Active Sessions/Users (min, Last hour)

RESOURCES

DB Connection Pools

jdbc/TradeDataSource	10 OF 50 IN USE	20 %
jdbc/CyaneaDataSource	0 OF 10 IN USE	0 %

THREAD POOLS

SoapConnectorThreadPool	3 OF 5 MAX	60 %
SoapConnectorThreadPool	3 OF 5 MAX	60 %
ORB.thread.pool	2 OF 50 MAX	4 %
MessageListenerThreadPool	0 OF 50 MAX	0 %
Servlet.Engine.Transports	11 OF 50 MAX	22 %
SoapConnectorThreadPool	3 OF 5 MAX	60 %

SERVER STATISTICS

CPU Utilization (%), Last Hour

JVM Memory Utilization (%), Last hour

Throughput: 10936 (Last Hour)

Uptime: 19:06:54

Application Name(s): testware.ear
Trade3.ear

Server Activity Display (Active Requests)

SERVER SELECTION

Group: AIX Cluster Server: qaapp-aix-s01_node.server1.92992 (L3)

Active Requests Recent Requests

SERVER INFO				RECENT ACTIVITY (Last Minute)			
Snapshot Date	Sep 15, 2004	Application Server Name	server1	JVM CPU	5.75%	JVM Heap Size (MB)	166
Snapshot Time	2:14:02 PM	Application Server IP Address	192.168.4.8	# of Requests	334	Avg. Response Time (ms)	545
Platform CPU % Utilization	12.38%	Total Thread Count	5	# of Live Sessions	831		

ACTIVE REQUESTS

Filter By: Thread Type : Any Thread Status : Any Refresh

Client Request	Client Request Start	Thread ID	Resident Time (ms)	Accumulated CPU(ms)	Idle Time (ms)	Thread Status	Last Known Class	Last Known Method	Last Known Action	User ID
/trade/scenario	Sep 15, 2004 2:13:56 PM	1495864064	9054	0.000	9054	Waiting	N/A	N/A	JCA Request	N/A
/trade/scenario	Sep 15, 2004 2:13:57 PM	1495539584	7162	10.000	7152	Runnable	N/A	N/A	JCA Request	N/A
/trade/scenario	Sep 15, 2004 2:13:59 PM	1552454144	5903	20.000	5883	Runnable	N/A	N/A	JCA Request	N/A
/trade/scenario	Sep 15, 2004 2:13:59 PM	1533192448	5483	10.000	5473	Runnable	N/A	N/A	JCA Request	N/A
/trade/scenario	Sep 15, 2004 2:14:00 PM	1508505856	5064	0.000	5064	Runnable	N/A	N/A	JCA Request	N/A

Server Activity Display (*Recent Requests*)

SERVER SELECTION

Group: AIX Cluster Server: qaapp-aix-s01_node.server1.92992 (L3)

Active Requests Recent Requests

SERVER INFO				RECENT ACTIVITY (Last Minute)			
Snapshot Date	Sep 15, 2004	Application Server Name	server1	JVM CPU	3.00 %	JVM Heap Size (MB)	145
Snapshot Time	2:17:30 PM	Application Server IP Address	192.168.4.8	# of Requests	478	Avg. Response Time (ms)	180
Platform CPU % Utilization	4.25%	Total Thread Count	100	# of Live Sessions	775		

RECENT REQUESTS

Filter By	Thread Type : Any	Refresh			
Client Request	Client Request Start	Response Time (ms)	Accumulated CPU(ms)	Idle Time (ms)	User ID
/trade/scenario	Sep 15, 2004 2:17:21 PM	322	80.000	242	N/A
/trade/scenario	Sep 15, 2004 2:17:23 PM	262	90.000	172	N/A
/trade/scenario	Sep 15, 2004 2:17:22 PM	208	40.000	168	N/A
/trade/scenario	Sep 15, 2004 2:17:18 PM	171	30.000	141	N/A
/trade/scenario	Sep 15, 2004 2:17:18 PM	170	10.000	160	N/A
/trade/scenario	Sep 15, 2004 2:17:29 PM	154	40.000	114	N/A
/trade/scenario	Sep 15, 2004 2:17:22 PM	149	20.000	129	N/A

Method Flow View

Nesting Summary Drilldown View Flow View Search

Threshold Highlighter
 Δ Elapsed Time >= 5 (ms) Δ CPU Time >= 5.0 (ms) Apply Reset

COMPLETE FLOW VIEW 1000 per Page

Queue Names Match Queue Names Don't Match ** indicates values that cross thresholds.

1 - 18 of 18 Results

Depth	Event Type	Event Data	Elapsed Time (ms)	CPU Time (ms)	Δ Elapsed Time (ms)	Δ CPU Time (ms)
0	EJB Entry	EJB Name:itso.cics.eci.j2ee.trader.TraderCICSECIBean Method:create	0	0	0	0
1	Method Entry	itso.cics.eci.j2ee.trader.EJSStatefulTraderCICSECIHomeBean_4.create	63	15.625	** 63 **	** 15.625 **
2	Method Entry	itso.cics.eci.j2ee.trader.TraderCICSECIBean.<init>	63	15.625	0	0
2	Method Exit	itso.cics.eci.j2ee.trader.TraderCICSECIBean.<init>	63	15.625	0	0
2	Method Entry	itso.cics.eci.j2ee.trader.EJSRemoteStatefulTraderCICSECI_427.<init>	78	31.25	** 15 **	** 15.625 **
2	Method Exit	itso.cics.eci.j2ee.trader.EJSRemoteStatefulTraderCICSECI_427.<init>	78	31.25	0	0
2	Method Entry	itso.cics.eci.j2ee.trader._EJSRemoteStatefulTraderCICSECI_42.<clinit>	141	93.75	** 63 **	** 62.5 **
2	Method Exit	itso.cics.eci.j2ee.trader._EJSRemoteStatefulTraderCICSECI_42.<clinit>	141	93.75	0	0
2	Method Entry	itso.cics.eci.j2ee.trader._EJSRemoteStatefulTraderCICSECI_42.<init>	141	93.75	0	0
2	Method Entry	itso.cics.eci.j2ee.trader._TraderCICSECI_Stub.<clinit>	250	203.125	** 109 **	** 109.375 **
2	Method Exit	itso.cics.eci.j2ee.trader._TraderCICSECI_Stub.<clinit>	250	203.125	0	0
2	Method Entry	itso.cics.eci.j2ee.trader._TraderCICSECI_Stub.<init>	250	203.125	0	0
2	Method Exit	itso.cics.eci.j2ee.trader._TraderCICSECI_Stub.<init>	250	203.125	0	0

In-flight Request Search

IBM WSAM ADMINISTRATION AVAILABILITY PROBLEM DETERMINATION PERFORMANCE ANALYSIS LOGOUT HELP

IN-FLIGHT REQUEST SEARCH
In the Search Request box, type the name of the request for which you are searching. If you leave this box empty, all active requests will display.

SEARCH CRITERIA

Group: All Groups
Server: All Servers
Search Request/Transaction: OK

SEARCH RESULTS

Timestamp	Client Request/Transaction		Start Date/Time	Thread/Task ID	Total Resident Time (ms)	User ID
Oct 7, 2004 7:53:55 PM						
	<u>Server Name</u>	<u>Client Request/Transaction</u>	<u>Start Date/Time</u>	<u>Thread/Task ID</u>	<u>Total Resident Time (ms)</u>	<u>User ID</u>
ADCDPL.M2L2.M2L2.CIC22QA2.96 (L3)	X	CKTI	Oct 7, 2004 7:42:28 PM	26	605759	IBMUSER
ADCDPL.M2L2.M2L2.servqa.77 (L3)	X	/cyanea_one/testware/thread?ttl=120&generateCpuTime=false&req	Oct 7, 2004 7:52:30 AM	764962120	34097	N/A
ADCDPL.M2L2.M2L2.servqa.76 (L3)	X	/CTGTesterECIWeb/CTGTesterECIServlet	Oct 7, 2004 7:53:00 PM	758065808	3454	N/A
ADCDPL.M2L2.M2L2.CIC23QA2.bc3 (L3)	X	CSMI	Oct 7, 2004 7:53:48 PM	101	3186	CICSUSER
ADCDPL.M2L2.M2L2.CIC23QA1.bcc (L3)	X	CSMI	Oct 7, 2004 7:53:48 PM	45	2974	CICSUSER

Memory Diagnosis – Memory Analysis Report

MEMORY ANALYSIS OPTIONS

Group: AIX Cluster
Server: qaapp-aix-s03_node.server3.39208 (L)
Metric 1: # of GCs
Metric 2: Avg. Response Time
Time: Last 60 Minutes

SUPPLEMENTAL INFO

Timestamp: Sep 15, 2004 11:21:58 AM
Actual Range: Sep 15, 2004 10:21:00 AM - Sep 15, 2004 11:21:00 AM

OF GCs

Average	1
Minimum	1
Maximum	2

AVG. RESPONSE TIME

Average	1127
Minimum	0
Maximum	60004

PRIMARY METRIC: # OF GCs

SECONDARY METRIC: AVG. RESPONSE TIME

RECENT ACTIVITY RESULTS TABLE

Minutes Ago	# OF GCs	AVG. RESPONSE TIME
1	1	0 ms
2	1	0 ms
3	1	0 ms
4	1	0 ms

Memory Analysis – Heap Analysis Results

SERVER SELECTION

Group	AIX Cluster
Server	qaapp-aix-s03_node.server3.39208
GC	<input type="radio"/> Yes <input checked="" type="radio"/> No

Ok

CLASSNAME FILTER OPTION

Exclude	com.cyanea.* , javax.* , oracle.* , sun.* , java.* , com.sun.* , com.ibm.* , weblogic.* , COM.rsa.* , org.w3c.* , org.omg.* , org.xml.* , com.beasys.* , utils.version.* , org.apache.* , flexlm.* , antlr.* , com.tivoli.* , \$P* .*, COM.ibm.* , com.ipla
Exclude Override	<input type="text"/>

Apply **Reset**

HEAP PROPERTIES

App Server	qaapp-aix-s03_node.server3.39208 (L2)	Time of Snapshot	Sep 15, 2004 11:26:31 AM
Size of Live Objects on Heap (MB)	23 (4477588 bytes)	# of Objects in Heap	462489
Force GC	No		

HEAP ANALYSIS RESULTS TABLE 20 per Page

Class name	Total size (kb)	Percent of total size	# of instances	Percent of total #
primitive[]	11661	48.0 %	94650	20.0 %
object[]	3238	13.0 %	45612	9.0 %
org/eclipse/emf.ecore/impl/EAttributeImpl	101	0.0 %	1132	0.0 %
org/eclipse/emf.ecore/impl/EReferenceImpl	63	0.0 %	652	0.0 %
org/eclipse/emf.ecore/impl/EClassImpl	56	0.0 %	576	0.0 %
org/eclipse/emf.ecore/util/EObjectContainmentEList	35	0.0 %	1307	0.0 %
org/eclipse/emf/common/notify/impl/NotifierImpl\$1	25	0.0 %	1295	0.0 %
org/eclipse/emf.ecore/impl/EObjectImpl\$EPropertiesHolderImpl	24	0.0 %	913	0.0 %
org/eclipse/emf/common/util/URI	17	0.0 %	398	0.0 %
org/eclipse/emf.ecore/util/EObjectResolvingEList	11	0.0 %	407	0.0 %
org/eclipse/emf.ecore/util/EcoreEList\$UnmodifiableEList	10	0.0 %	526	0.0 %
org/eclipse/emf.ecore/util/EContentsEList	9	0.0 %	822	0.0 %
org/eclipse/emf.ecore/impl/EEnumLiteralImpl	9	0.0 %	283	0.0 %
org/eclipse/emf.ecore/impl/EClassImpl\$4	8	0.0 %	297	0.0 %
org/eclipse/emf.ecore/util/EObjectContainmentWithInverseEList	6	0.0 %	228	0.0 %
org/eclipse/emf.ecore/impl/EEnumImpl	5	0.0 %	96	0.0 %
org/eclipse/emf.ecore/impl/ESuperAdapter	4	0.0 %	408	0.0 %
org/eclipse/emf.ecore/impl/EPackageImpl\$1	3	0.0 %	99	0.0 %
org/eclipse/emf.ecore/impl/EPackageImpl\$2	3	0.0 %	72	0.0 %
org/eclipse/emf.ecore/impl/EOperationImpl	3	0.0 %	87	0.0 %

1 - 20 of 101 Results 1 2 3 4 5 6 Next > Last >>

Memory Diagnosis – Memory Leak Candidate Finder Report

MENU

- [Management Overview](#)
- [Comparison Data](#)
- [Heap 1 Data](#)
- [Heap 2 Data](#)

CLASSNAME FILTER OPTION

Exclude:

```
com.cyanea.* , javax.* ,
oracle.* , sun.* , java.* ,
com.sun.* , com.ibm.* ,
weblogic.* , COM.rsa.* ,
org.w3c.* , org.omg.* ,
org.xml.* , com.beasys.* ,
utils.version.* , org.apache.* , flexlm.* , antlr.* , com.tivoli.* , $P* ,
.* , COM.ibm.* , com.ipla
```

Exclude Override:

HEAP PROPERTIES

App Server	qaapp-aix-s03_node.server3 (L2)	Time of Snapshot	Sep 15, 2004 11:36:37 AM
Size of Live Objects on Heap (MB)	18 (19679996 bytes)	# of Objects in Heap	395787
GC	Yes		

HEAP ANALYSIS RESULTS TABLE

1 - 20 of 101 Results
20 per Page

Class name	Total size (kb)	Percent of total size	# of instances	Percent of total #
primitive[]	8575	44%	78390	19%
object[]	2555	13%	39689	10%
org/eclipse/emf.ecore/impl/EAttributeImpl	101	0%	1132	0%
org/eclipse/emf.ecore/impl/EReferenceImpl	63	0%	652	0%
org/eclipse/emf.ecore/impl/EClassImpl	56	0%	576	0%
org/eclipse/emf.ecore/util/EObjectContainmentEList	35	0%	1307	0%
org/eclipse/emf/common/notify/impl/NotifierImpl\$1	25	0%	1295	0%
org/eclipse/emf.ecore/impl/EObjectImpl\$EPropertiesHolderImpl	24	0%	913	0%
org/eclipse/emf/common/util/URI	17	0%	398	0%
org/eclipse/emf.ecore/util/EObjectResolvingEList	11	0%	407	0%
org/eclipse/emf.ecore/util/EcoreEList\$UnmodifiableEList	10	0%	526	0%
org/eclipse/emf.ecore/util/EContentsEList	9	0%	822	0%



Reporting

- Create Reports
 - ▶ Application Reports
 - Request Transaction
 - Method/ Program
 - SQL
 - MQI
 - Top Reports
 - ▶ Server Reports
 - System Resource
 - Server Availability
 - Capacity Analysis
- View Saved Reports
- Daily Statistics

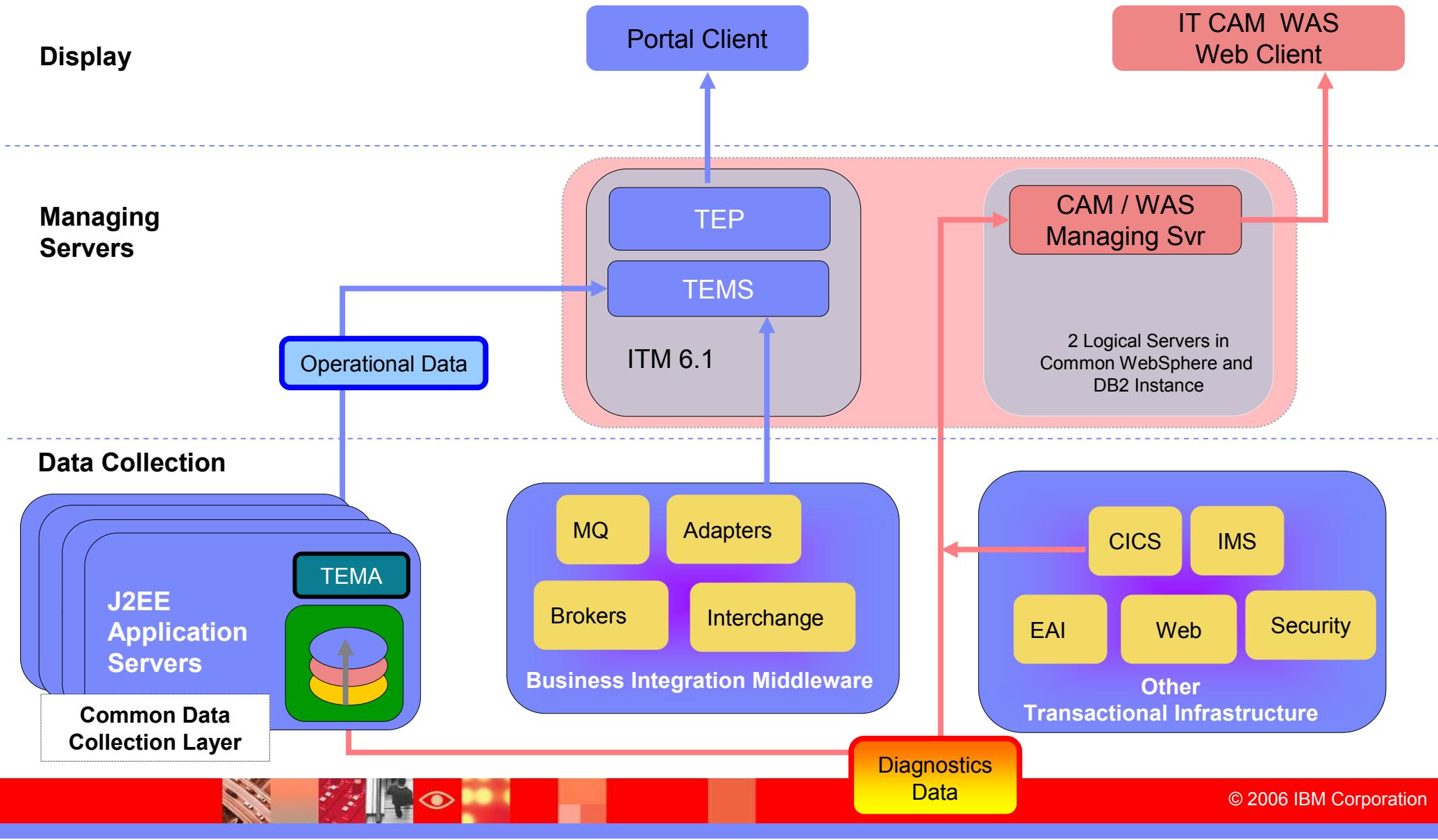


Operator UI: Tivoli Enterprise Portal

Tivoli software



High Level CAM Logical Architecture Diagram



TEP Integration: WebSphere App Server workspace

Welcome SYSADMIN

Tivoli Enterprise Portal

File Edit View Help

View: Physical

Enterprise

- Linux Systems
- Windows Systems
 - BANDUNG
 - Services Management Agent
 - WebSphere Agent
 - WebSphere App Server
 - Request Analysis
 - Garbage Collection Analysis
 - Log Analysis
 - Pool Analysis
 - Datasources
 - JMS Summary
 - Web Applications
 - EJB Containers
 - DB Connection Pools
 - J2C Connection Pools
 - Thread Pools
 - Cache Analysis
 - Workload Management
 - BEIJING
 - KHARTOUM
 - LAREDO
 - SALEM
 - VIENNA

Physical Logical

Heap Usage - History

Response Time - History

Request Rate - History

Percent CPU Used - History

Application Server Summary

Server Name	Sample Date and Time	Interval (sec)	Status	Version	Start Date and Time	JVM Memory Free (bytes)	JVM Memory Total (bytes)	JVM Memory Used (bytes)	CPU Used (ms)	CPU Used (%)	Instrumentation Level	Pro
bandung1(AppSrv01)	11/16/05 09:09:06	501	Connected	was6010	11/15/05 07:35:17	26879912	118553088	91673176	6140	1.2	Custom	34

Tivoli Enterprise Portal Integration

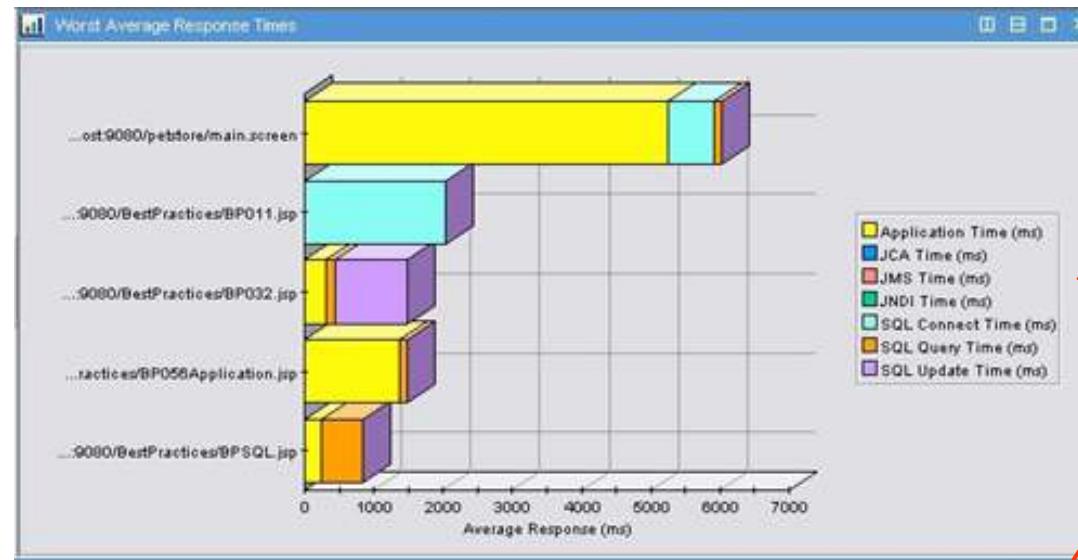
TEP Workspaces Overview

- ▶ Request Analysis
- ▶ Garbage Collection and Allocation Failure Analysis
- ▶ Pool Analysis
- ▶ Datasources
- ▶ JMS Summary
- ▶ Web Applications
- ▶ EJB Containers
- ▶ DB2 Connection Pools
- ▶ J2C Connection Pools
- ▶ Thread Pools
- ▶ Cache Analysis
- ▶ Workload Management

IT CAM for WebSphere - TEP Workspaces

Request Analysis

- Operations teams track the average response time for requests processed on the app server, and can quickly detect issues when delays increase over time or spike. This workspace shows the worst average response times broken down by Java Component



Response Times: Application, JCA, JMS, JNDI, SQL connection/query/update

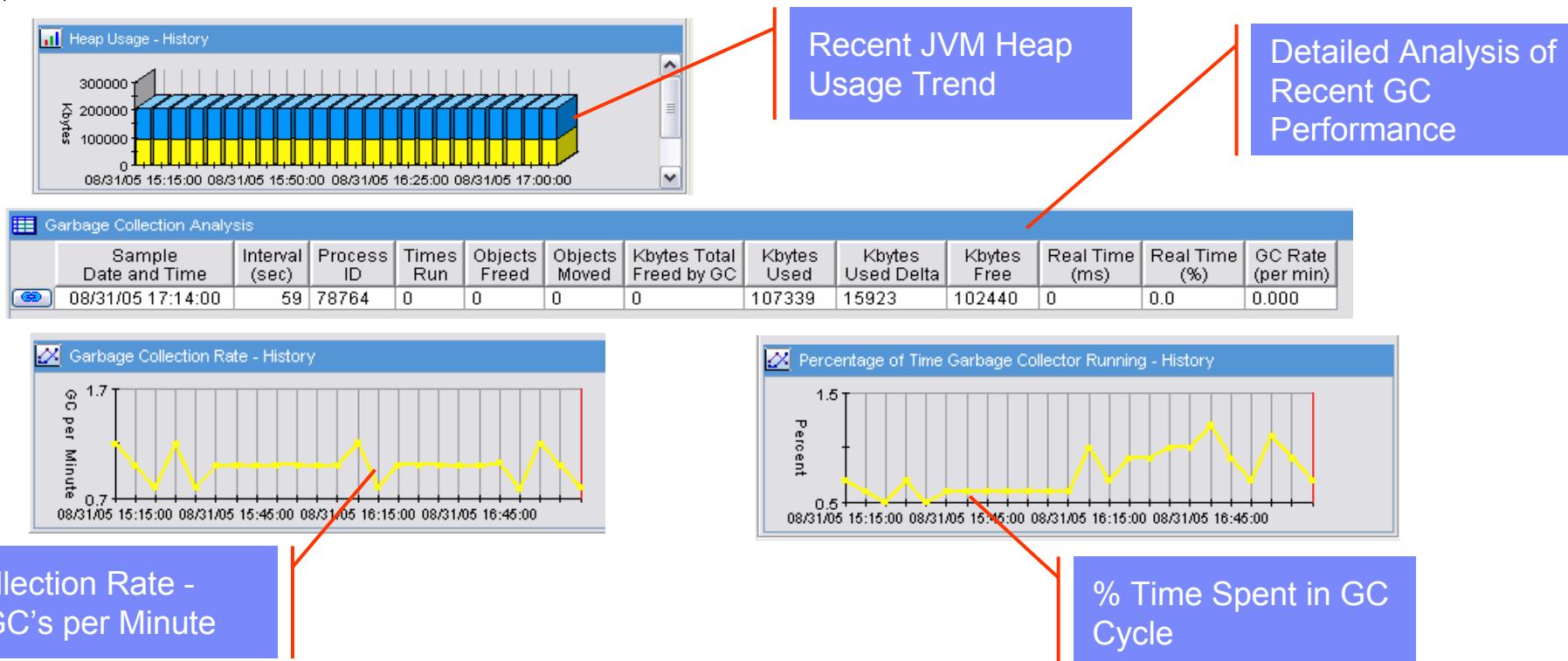
Request Label	Request Name	Request Detail	Request Type	Sample Date and Time	Interval Time	Request Count	Request Rate	Average Response	L0
...ost:9080/p...	http://localhost:90...	/petstore/main.screen	Servlet	07/11/05 16:21:54	60	1	0.016	6029	602
...9080/Best...	http://localhost:90...	/BestPractices/BP011.jsp	Servlet	07/11/05 16:21:54	60	1	0.016	2243	224
...9080/Best...	http://localhost:90...	/BestPractices/BP032.jsp	Servlet	07/11/05 16:21:54	60	3	0.050	1505	243
...actices/BP...	http://localhost:90...	/BestPractices/BP056Ap...	Servlet	07/11/05 16:21:54	60	2	0.033	1487	158
...9080/Best...	http://localhost:90...	/BestPractices/BPSQL.jsp	Servlet	07/11/05 16:21:54	60	2	0.033	841	128
...9080/petst...	http://localhost:90...	/petstore/category.screen	Servlet	07/11/05 16:21:54	60	1	0.016	701	701
...9080/Best...	http://localhost:90...	/BestPractices/BP056.jsp	Servlet	07/11/05 16:21:53	60	1	0.016	100	100
... Shopping	com.sun.j2ee.blue...	create	'EJB Method'	07/11/05 16:21:53	60	2	0.033	70	130
...80/petstore...	http://localhost:90...	/petstore/CatalogDAOSQ...	Servlet	07/11/05 16:21:54	60	1	0.016	40	40
... acadelocal...	com.sun.j2ee.blue...	getShoppingCart	'EJB Method'	07/11/05 16:21:54	60	2	0.033	40	80
... ControllerE...	com.sun.j2ee.blue...	getShoppingClientF...	'EJB Method'	07/11/05 16:21:54	60	2	0.033	5	10

Tabular data set with drill-down response time values for JCA, JMS, JDBC

IT CAM for WebSphere - TEP Workspaces

Garbage Collection Analysis

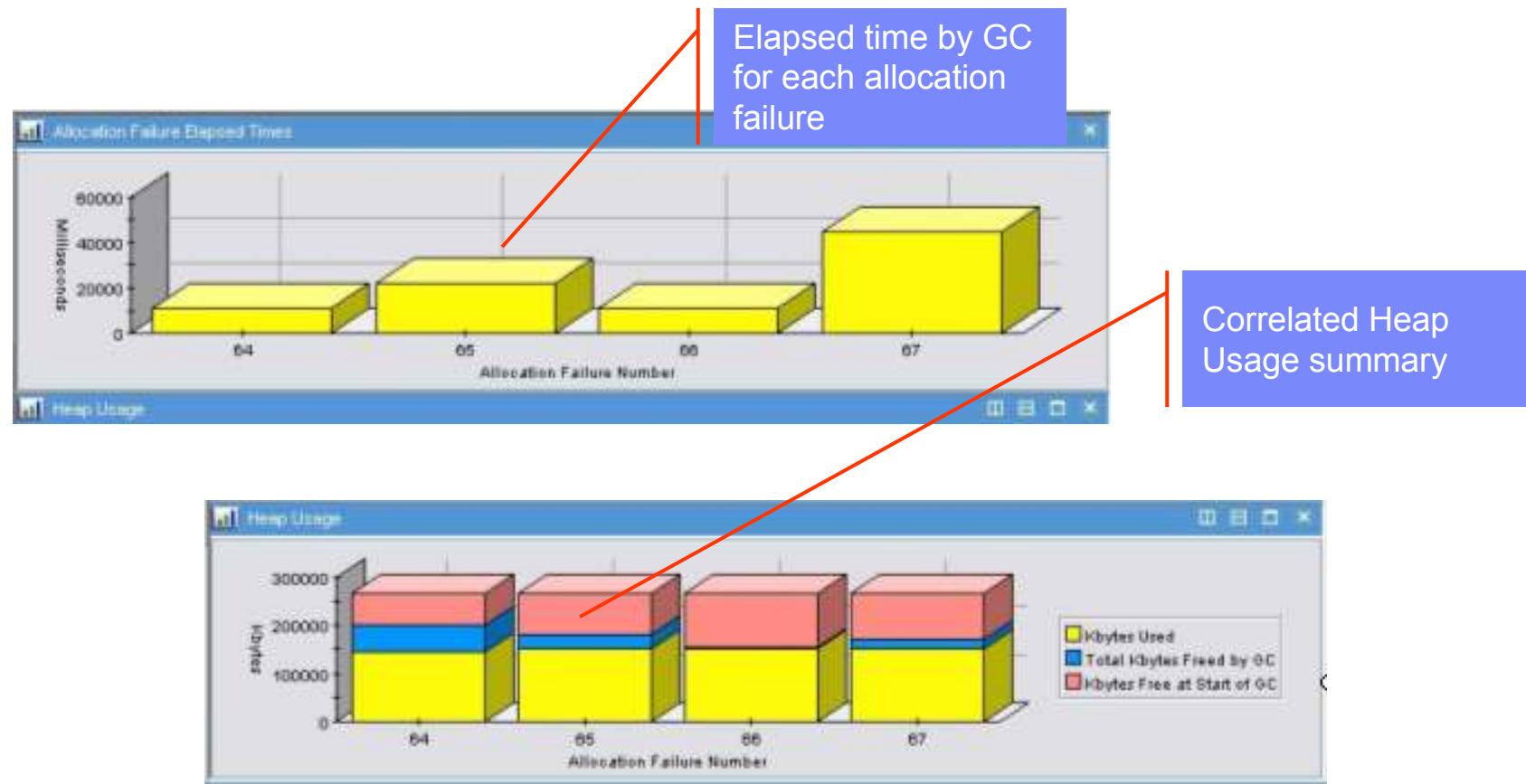
- Garbage Collection (GC) metrics such as frequency and time to complete can have a large effect on application server performance (during this time no other application processing can take place). This workspace shows a detailed breakdown of GC behavior and provides a complete analysis of GC performance metrics.



IT CAM for WebSphere - TEP Workspaces

Allocation Failures (Drilldown on GC)

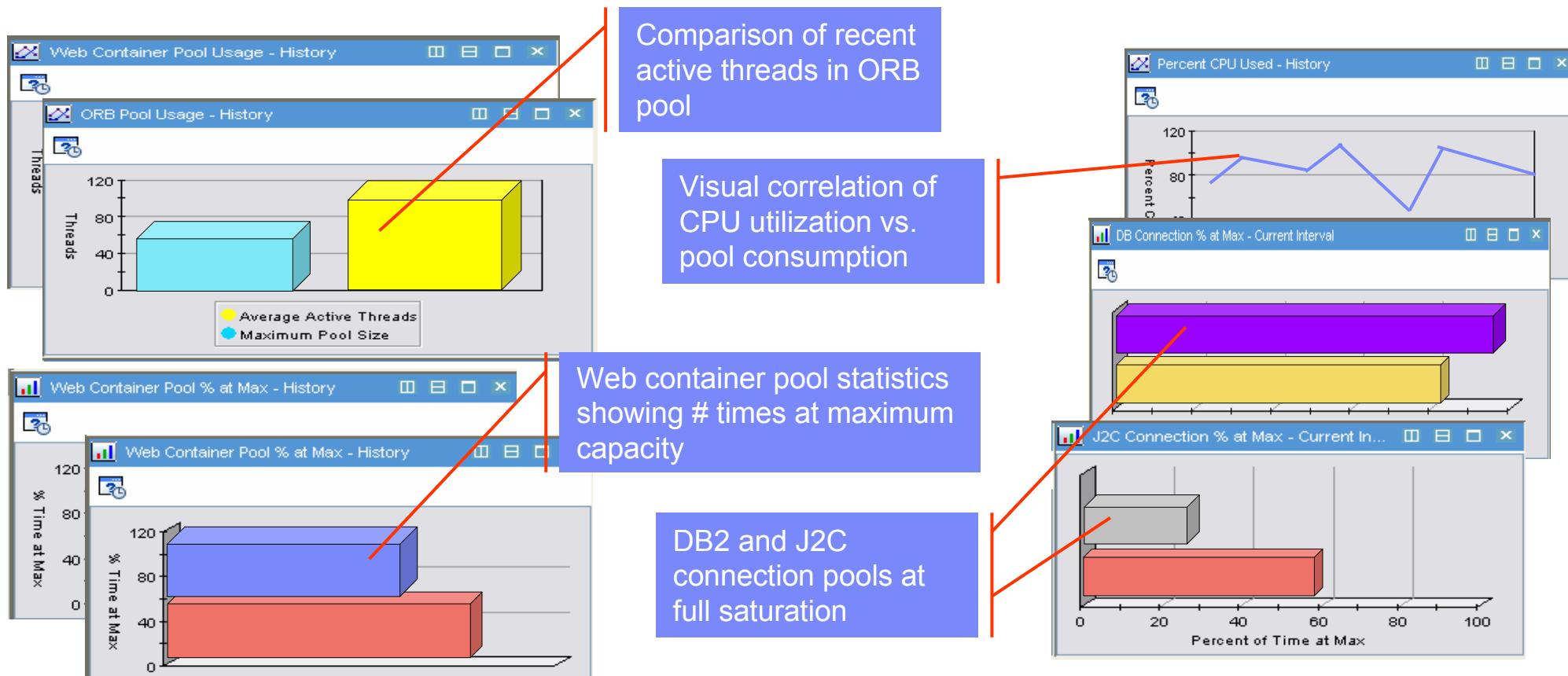
- Drill down from the Garbage Collector Activity workspace to see more details on the allocation failures that caused the GC to run.



IT CAM for WebSphere - TEP Workspaces

Pool Analysis

- J2EE resource pools are critical in terms of providing availability to commonly accessed services such as database access and other container pool types. This workspace enhances PMI data with configuration data to provide a comprehensive overview of requests flowing through WebSphere "funnel".



IT CAM for WebSphere - TEP Workspaces

Data Sources

- Displays PMI-based metrics for all defined data sources, highlighting worse update and query times

The screenshot displays three main components:

- Datasources - Current Interval:** A table showing PMI-based metrics for data sources. The columns include: Datasource Name, Sample Date and Time, Interval (sec), Database Product, Database Product Version, Total Wait Time (ms), Connection Count, Connection Rate (per sec), Connection Total Wait Time (ms), Connection Total Wait Time (ms), and Connection Total Wait Time (ms). A red arrow points from the "Database Product Version" column to a callout box.
- Worst Datasource Query Times:** A horizontal bar chart showing query times in milliseconds for three data sources. The x-axis ranges from 0 to 100. The bars are colored red, teal, and yellow. A red arrow points from the teal bar to a callout box.
- Worst Datasource Update Times:** A horizontal bar chart showing update times in milliseconds for three data sources. The x-axis ranges from 0 to 100. The bars are colored red, teal, and yellow. A red arrow points from the yellow bar to a callout box.

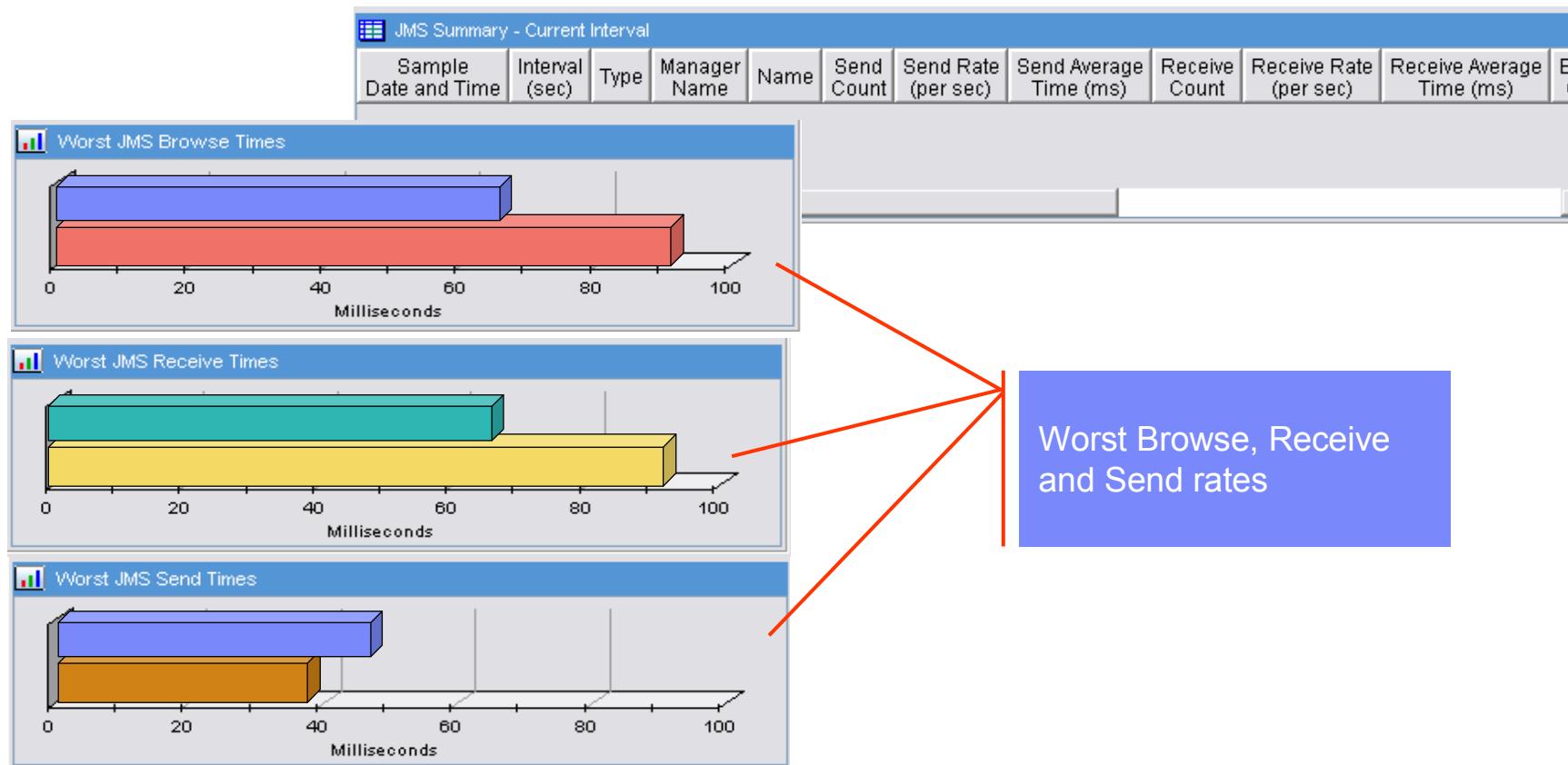
Callout Boxes:

- Top Callout:** Tabular data set with detailed comparisons of all defined data source performance metrics.
- Bottom Left Callout:** Delays on worst performing Data Sources (query and update).

IT CAM for WebSphere - TEP Workspaces

JMS Summary

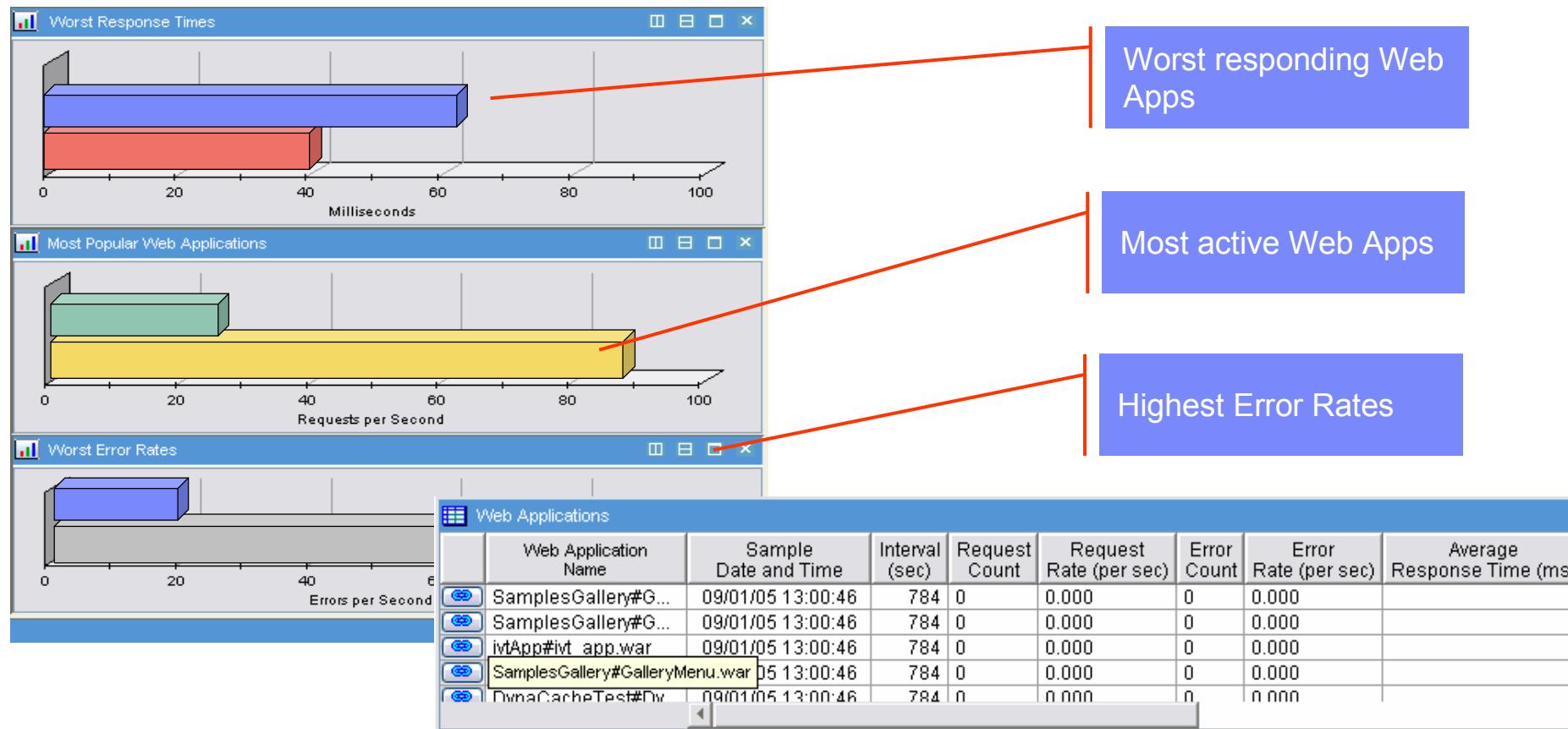
- Compares worst send, receive and browse times with detailed tabular views of JMS message performance



IT CAM for WebSphere - TEP Workspaces

Web Applications

- Shows recent trends for Web Application performance and bottlenecks



IT CAM for WebSphere - TEP Workspaces

EJB Containers

- Compare average response times with method invocation rates over time

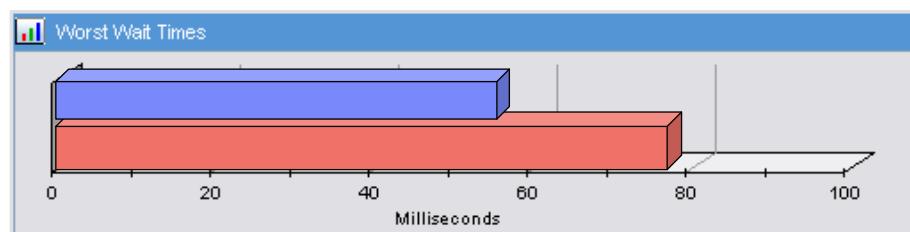
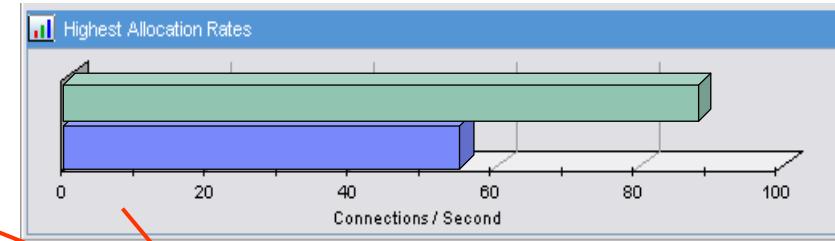
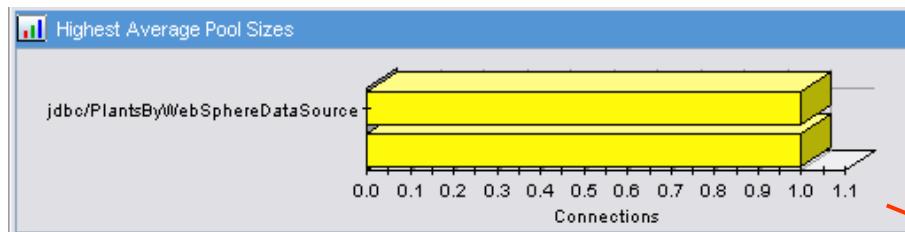


IT CAM for WebSphere - TEP Workspaces

DB Connection Pools

- Highlights largest pools, worst wait times and highest allocation rates

Datasource Label	Datasource Name	Sample Date and Time	Interval (sec)	Maximum Pool Size	Average Pool Size	Average Wait Time (ms)	Average Usage Time (ms)
DefaultDatasource	DefaultDatasource	09/01/05 13:07:43	6959		0.000		
jdbc/DefaultEJBT...	jdbc/DefaultEJBTimerDat...	09/01/05 13:07:43	6959		0.000		
jdbc/CyaneaData...	jdbc/CyaneaDataSource	09/01/05 13:07:43	6959	10	0.000		
jdbc/PlantsByWe...	jdbc/PlantsByWebSphere...	09/01/05 13:07:43	6959		1.000	0.000	517.500

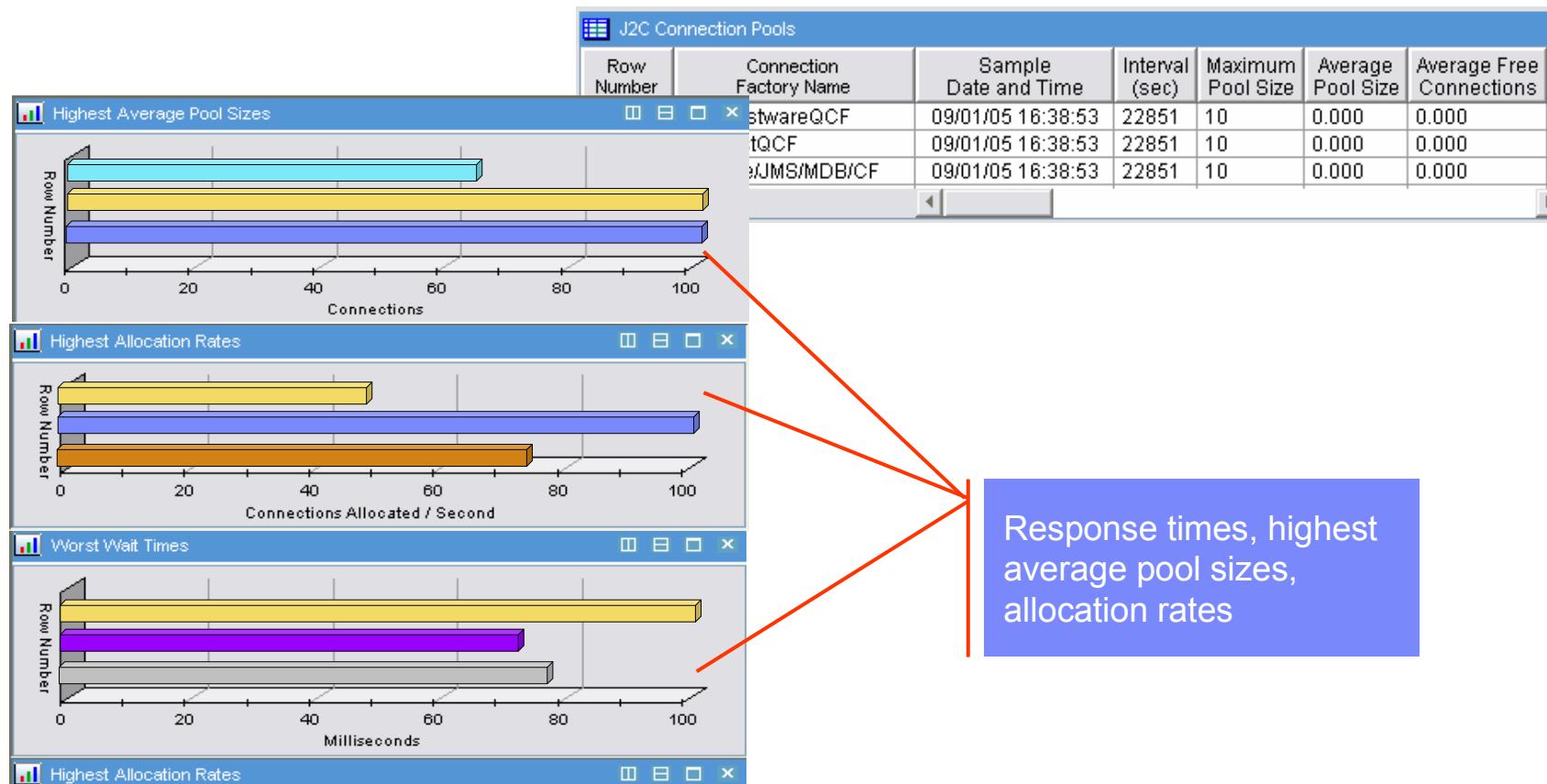


Response times, highest average pool sizes, allocation rates

IT CAM for WebSphere - TEP Workspaces

J2C Connection Pools

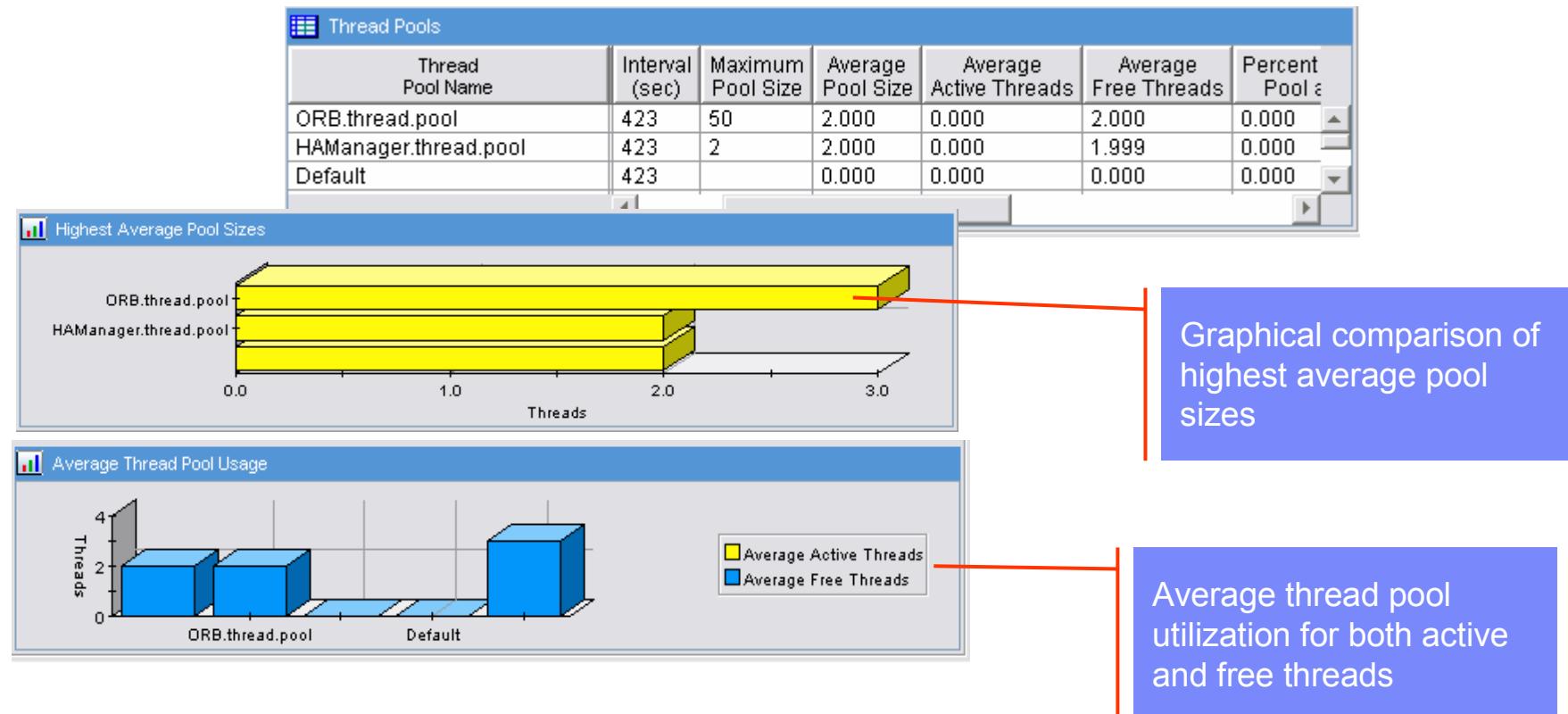
- For all defined DB Connection Pools, highlights largest pools, worst wait times and highest allocation rates



IT CAM for WebSphere - TEP Workspaces

Thread Pools

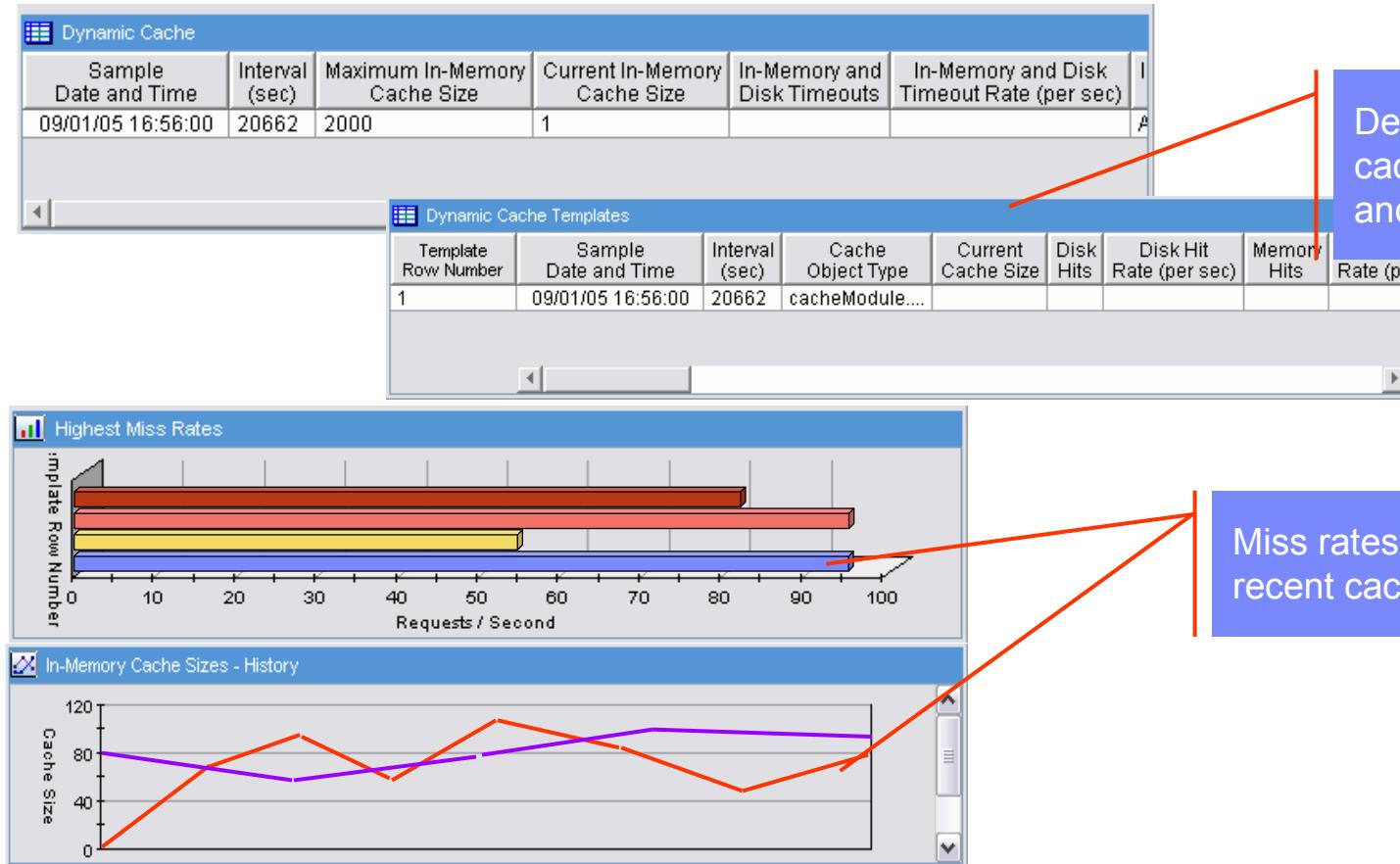
- Highlights largest pools, average active threads, and provides detailed statistics for all threads pools on WebSphere instance



IT CAM for WebSphere - TEP Workspaces

Cache Analysis

- Highlights in-memory cache sizes, shows cache templates with highest miss rates



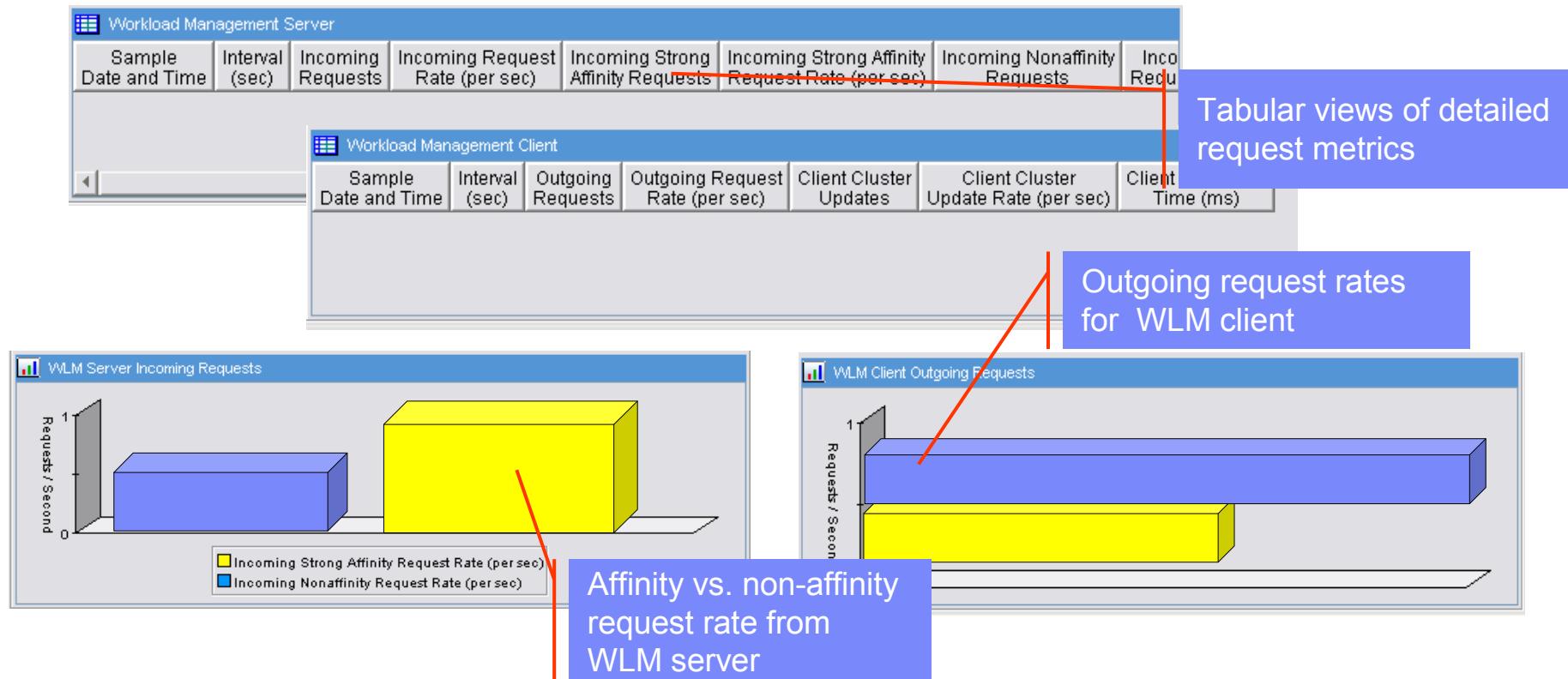
Detailed tabular views of cache metrics for analysis and tuning

Miss rates correlated with recent cache size trends

IT CAM for WebSphere - TEP Workspaces

Workload Management (client/server summary)

- Highlights performance health and recent trends for WorkLoad Manager clients and servers



Tivoli Enterprise Portal (TEP) Integration

Value to the Customer

TEP can be used as primary tool for IT Operations and support teams

- Ability to visualize and correlate performance metrics and trends from WebSphere and other monitored systems (messaging middleware, networks, databases) within a common user interface
- Automation of common IT tasks based on user-defined “Situations”
 - Enables “take action” control of managed systems including WebSphere, based responses to real-time J2EE resource data provisioned by IT CAM agents and services.
- Better user interface consistency across CAM product family and ITM 6.1

TEP Integration Features

- Single data collector for IT CAM for WebSphere and TEP/ITM (leverages ITM TEMA agent)
- Out-of-box user-composable TEP **workspaces**
- TEP **Situations** (can be applied to any IT CAM metrics for automation and alerting)
- Take **Actions** (enable Situations to control WebSphere environment)
- IT CAM data can be optionally **warehoused** for reporting and analysis
- Integration with **TEC** (direct to API)



IT CAM for J2EE Operations

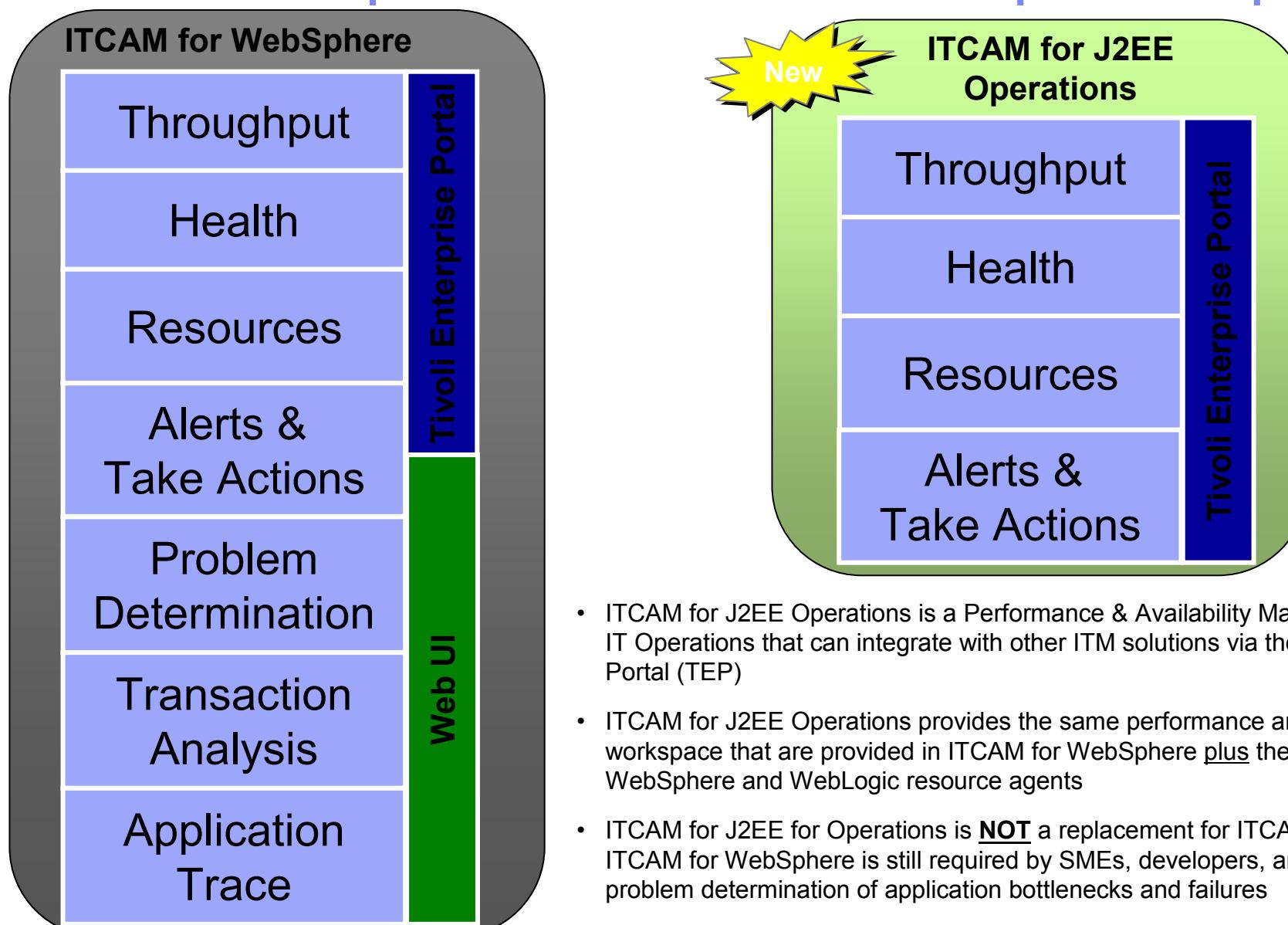
Tivoli software



ITCAM for J2EE Operations

- **What is ITCAM for J2EE Operations**
 - ▶ ITCAM for J2EE Operations is an enterprise scale composite application management solution that is based on the full featured ITCAM for WebSphere. ITCAM for J2EE Operations delivers application performance & availability monitoring, problem identification & isolation, and **Tivoli Enterprise Portal (TEP) integration** for comprehensive end-to-end IT Operations monitoring of your composite application.

ITCAM for J2EE Operations vs. ITCAM for WebSphere Comparison



ITCAM for J2EE Operations vs. ITCAM for WebSphere

Application Performance Management

- **Typical WebSphere application issues addressed by IT CAM for J2EE Operations**
 - ▶ Application Server availability
 - ▶ Application Server throughput
 - ▶ Application Resource consumption

Application Problem Determination

- **Typical WebSphere application issues addressed by IT CAM for WebSphere**
 - ▶ Transaction Faults
 - ❖ Hung / Stalled
 - ❖ Slow
 - ❖ Looping
 - ❖ Intermittent / Inconsistent performance
 - ▶ Exceptions / Failures
 - ▶ Application memory leaks
 - ▶ Application Server Configuration
 - ▶ Bottlenecks in coupled systems such as DB, JMS connections, IMS and CICS



ITCAM for J2EE Operations- Ensuring a better application

- ITCAM for J2EE Operations gives you access to a **managed application server** for greater peace of mind.
- **Installs and configures quickly** in your environment in just a few hours
- Provides **real-time status** of your applications health
- **Intuitive layout and UI** make it easy to identify and isolate application problems
- Provides **end-to-end composite application management** via integration to the Tivoli and ITCAM family of products.
- **Seamless Upgrade.** ITCAM for J2EE Operations can seamlessly be upgraded to the full ITCAM for WebSphere solution that provides deep-dive problem determination capabilities



Rational Integration

Tivoli software



ON DEMAND BUSINESS™

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Integrating Operations with Development

Rational RPT Performance Optimization Toolkit

Value to the Customer

Integration with Rational tooling

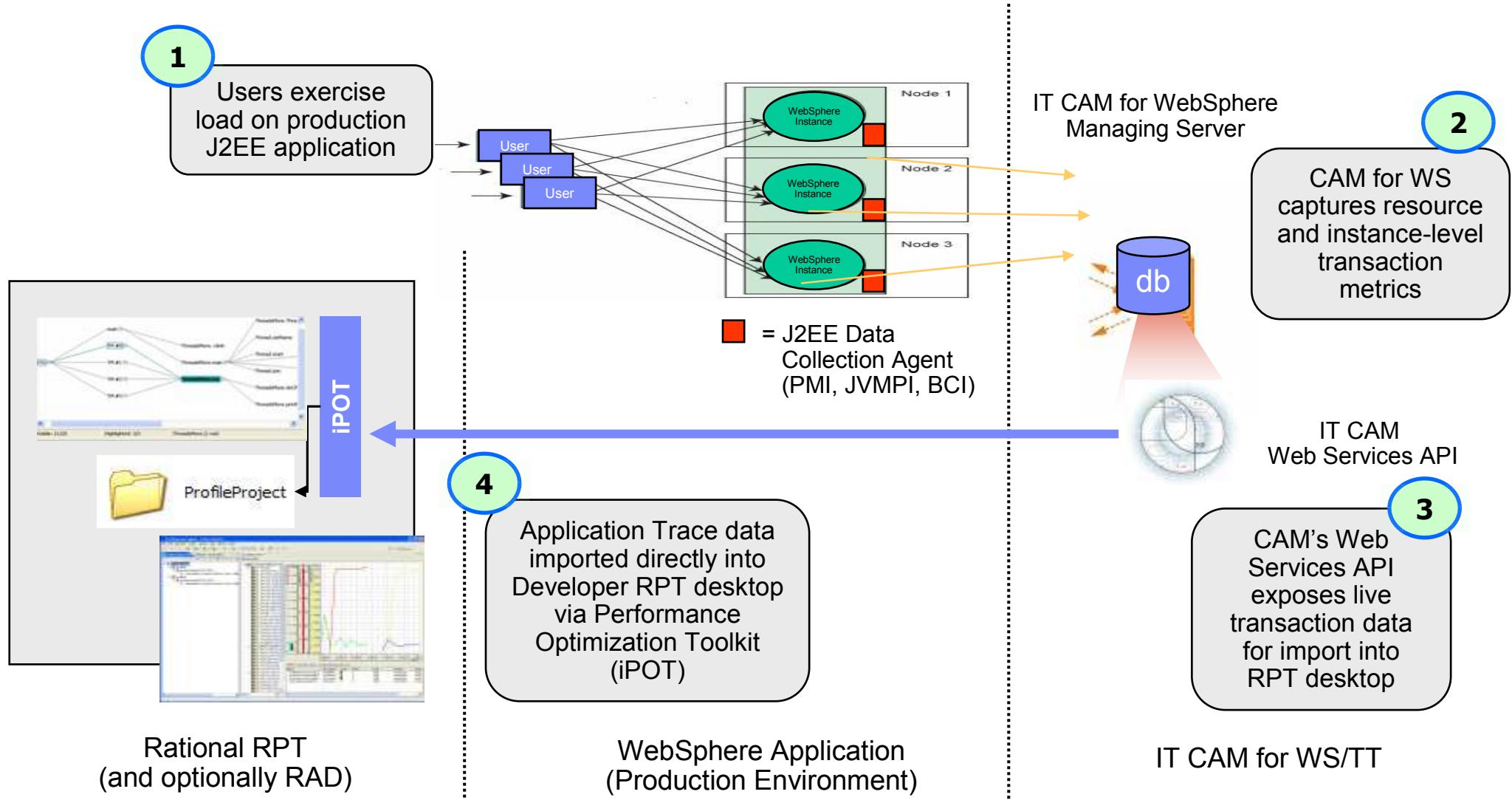
- Enables the Tivoli portfolio to manage the entire application lifecycle by facilitating direct access to production application performance data from the developer desktop
- Dramatically shortens time to repair defective code, and eliminates the need for developer to attempt/perform problem re-creation (sometimes impossible to do for SOA-based applications)

Rational Integration Features

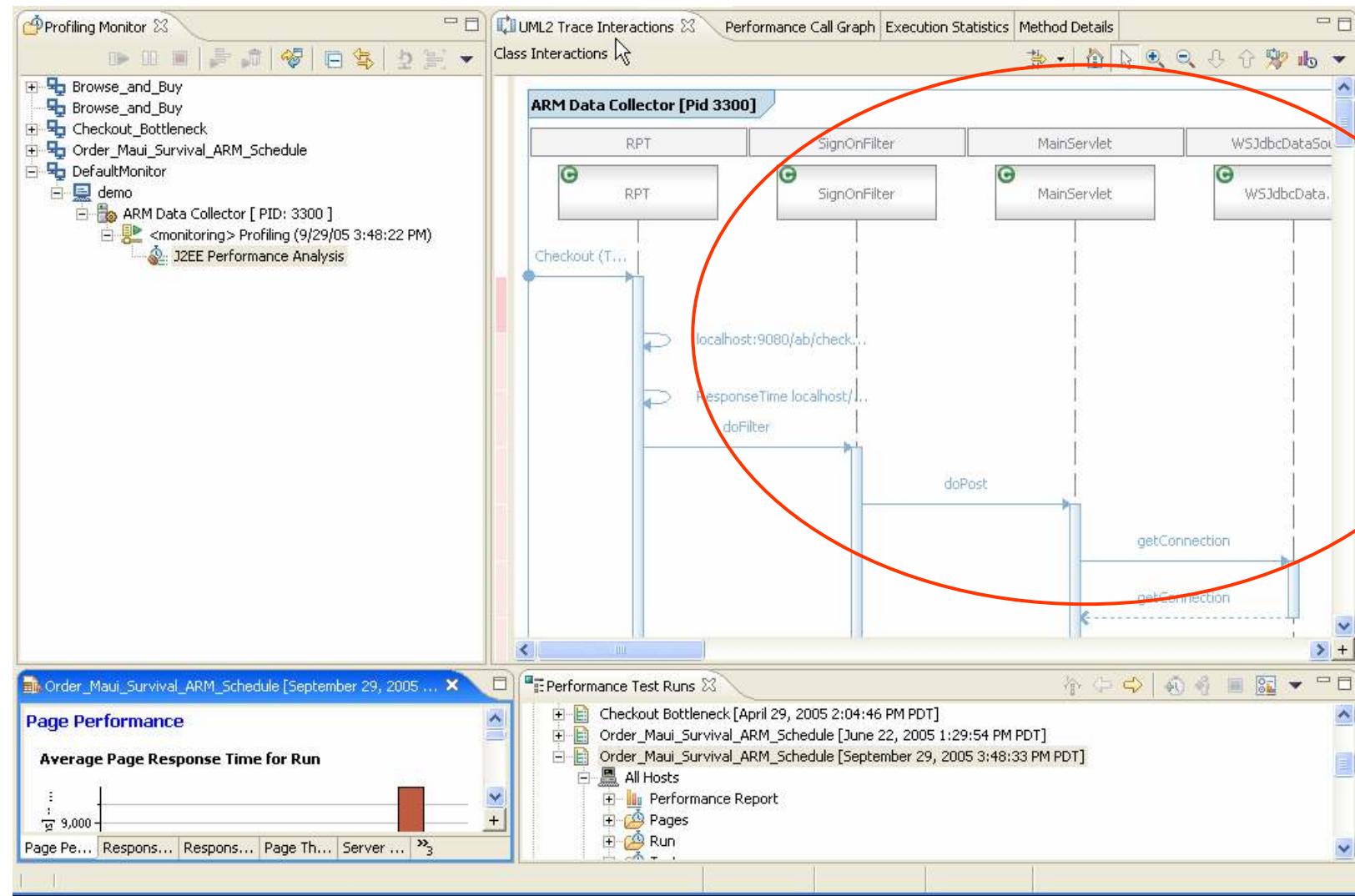
- IBM Performance Optimization Toolkit (IPOT) – optional Eclipse plug-in for Rational Performance Tester provides direct access IT CAM for WebSphere and IT CAM for Response Time Tracking (Managing Servers) to import live performance data
- Web services API – provides IPOT with secure access to IT CAM managing servers

Conceptual Overview:

Rational (RPT) Integration with IT CAM for WebSphere



iPOT integration with CAM #1



iPOT integration with CAM #2

UML2 Trace Interactions | Performance Call Graph | Execution Statistics | Method Details X

Method Details - ARM Data Collection Agent - Process: 3300

Method: PoEndpointBean.submitPurchaseOrder

Host: demo
Process: 3300
Calls: 4
Base Time: 41.72 Seconds
Cumulative Time: 43.04 Seconds
Avg Time: 10.43 Seconds
Min Time: 10.43 Seconds
Max Time: 10.43 Seconds
Source File: unknown

Callers

- MainServlet.doPost
- Thread: Thread-1228

Open Source

Descendants

- CNContextImpl.lookup

Highlight: Max Path to Root

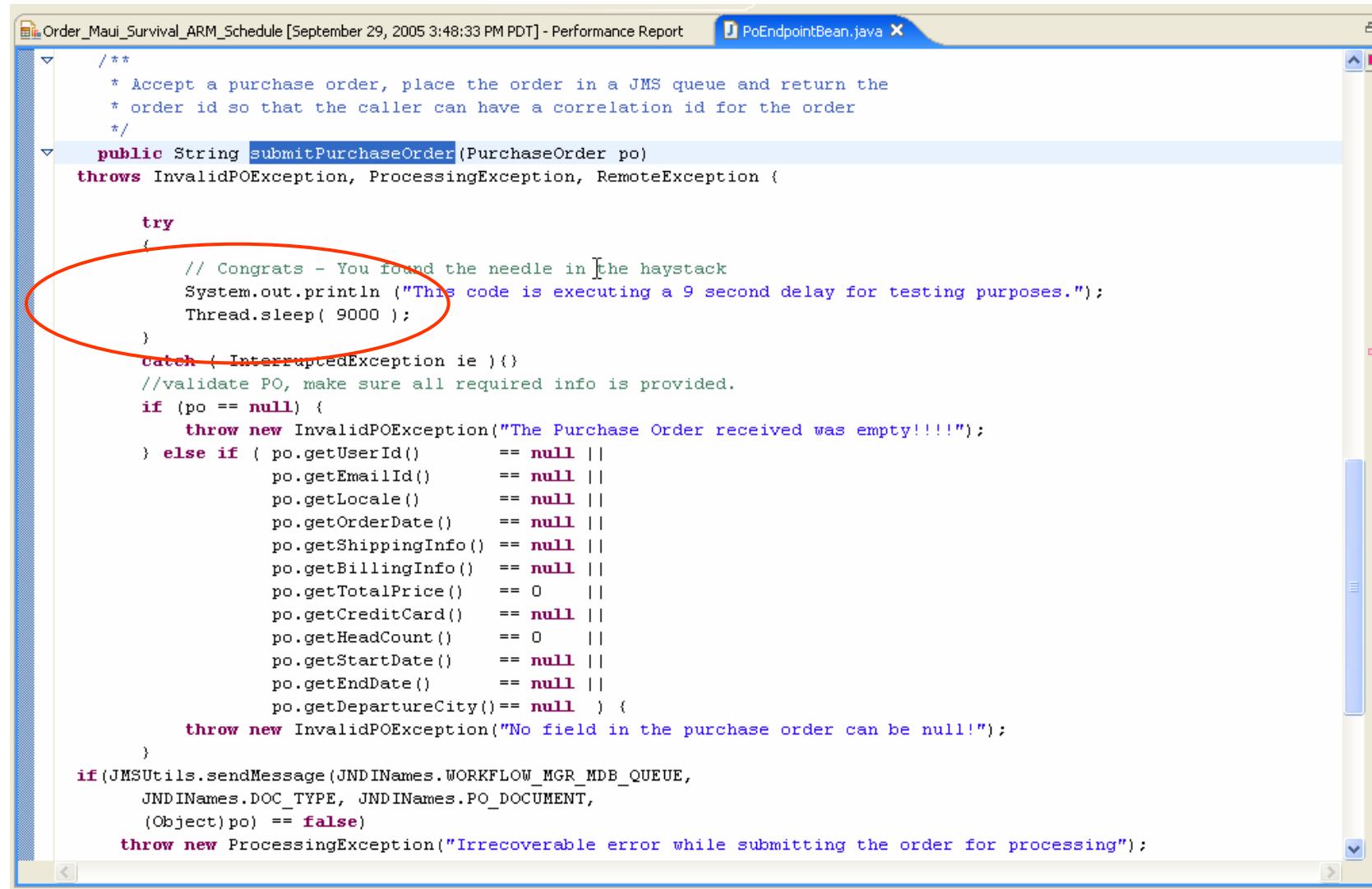
PoEndpointBean.submitPurchaseOrder
MainServlet.doPost
SignOnFilter.doFilter
RPT.localhost:9080/ab/checkout.do
RPT.Checkout
Thread: Thread-4040
Process: 3300

Host	Process	>Per...	Calls	Propagated Time
demo	3300	75.00	3	32.28
demo	3300	25.00	1	10.76

Descendant	Host	Process	>Per...	Calls	Propagated Time
CNContextImpl.lookup	demo	3300	3.06	4	1.32

A red circle highlights the "Open Source" option in the context menu, which is displayed over the "Callers" section. The menu also includes options like Refresh Views, Filter, Subtree, Navigate, and Show Call Graph.

iPOT integration with CAM #3



```
Order_Maui_Survival_ARM_Schedule [September 29, 2005 3:48:33 PM PDT] - Performance Report PoEndpointBean.java X

    /**
     * Accept a purchase order, place the order in a JMS queue and return the
     * order id so that the caller can have a correlation id for the order
     */
    public String submitPurchaseOrder(PurchaseOrder po)
        throws InvalidPOException, ProcessingException, RemoteException {

        try {
            // Congrats - You found the needle in the haystack
            System.out.println ("This code is executing a 9 second delay for testing purposes.");
            Thread.sleep( 9000 );
        }
        catch ( InterruptedException ie ) {}
        //validate PO, make sure all required info is provided.
        if (po == null) {
            throw new InvalidPOException("The Purchase Order received was empty!!!!");
        } else if ( po.getUserId() == null ||
                   po.getEmailId() == null ||
                   po.getLocale() == null ||
                   po.getOrderDate() == null ||
                   po.getShippingInfo() == null ||
                   po.getBillingInfo() == null ||
                   po.getTotalPrice() == 0 ||
                   po.getCreditCard() == null ||
                   po.getHeadCount() == 0 ||
                   po.getStartDate() == null ||
                   po.getEndDate() == null ||
                   po.getDepartureCity() == null ) {
            throw new InvalidPOException("No field in the purchase order can be null!");
        }
        if(JMSUtils.sendMessage(JNDINames.WORKFLOW_MGR_MDB_QUEUE,
                               JNDINames.DOC_TYPE, JNDINames.PO_DOCUMENT,
                               (Object)po) == false)
            throw new ProcessingException("Irrecoverable error while submitting the order for processing");
    }
}
```