Tivoli 洞悉全局：SOA 效能管理工具

May 2008

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Agenda

- Introduction
- ITCAM for Web Resources
- ITCAM for SOA
- ITCAM for WebSphere/J2EE
- IBM Tivoli Monitoring

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Application Management Main Concerns

1. End to End Monitoring
- Consolidation of health monitoring

2. End User Service Assurance
- Are my customers experiencing acceptable app performance?

Monitor → End User Response Time Monitoring | Application Resource Monitoring

3. Transaction Analysis
- If a business process fails, what component is causing the failure or slowdown?

Monitor Transactions → Application Tracking & Topology Analysis

4. J2EE Application Problem Resolution Tools
- J2EE server is down, very slow performance, must find and fix problem

Root-Cause Problem Analysis & Resolution → Trace and Diagnostics

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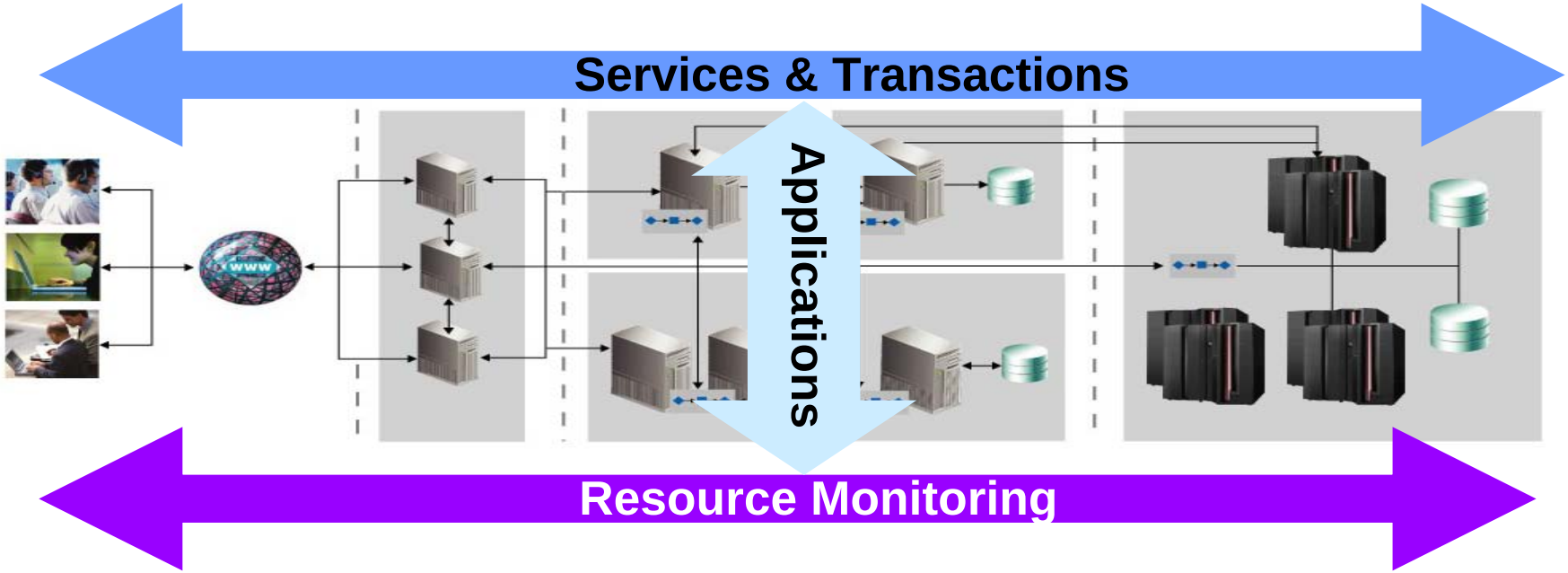
The ITCAM Solution Portfolio



ITCAM for SOA

ITCAM for RT

ITCAM for WebSphere/J2EE

ITCAM for Web Resources and IBM Tivoli Monitoring Family

- **Web Services automated mediation and problem identification**
- **End-to-end transaction tracking isolates problems**
- **Drill down diagnostics for WebSphere application performance problems, including links to CICS, MQ, IMS**
- **Resource monitoring for OS, Web Servers, App Servers, WebSphere MQ, Message Broker etc**

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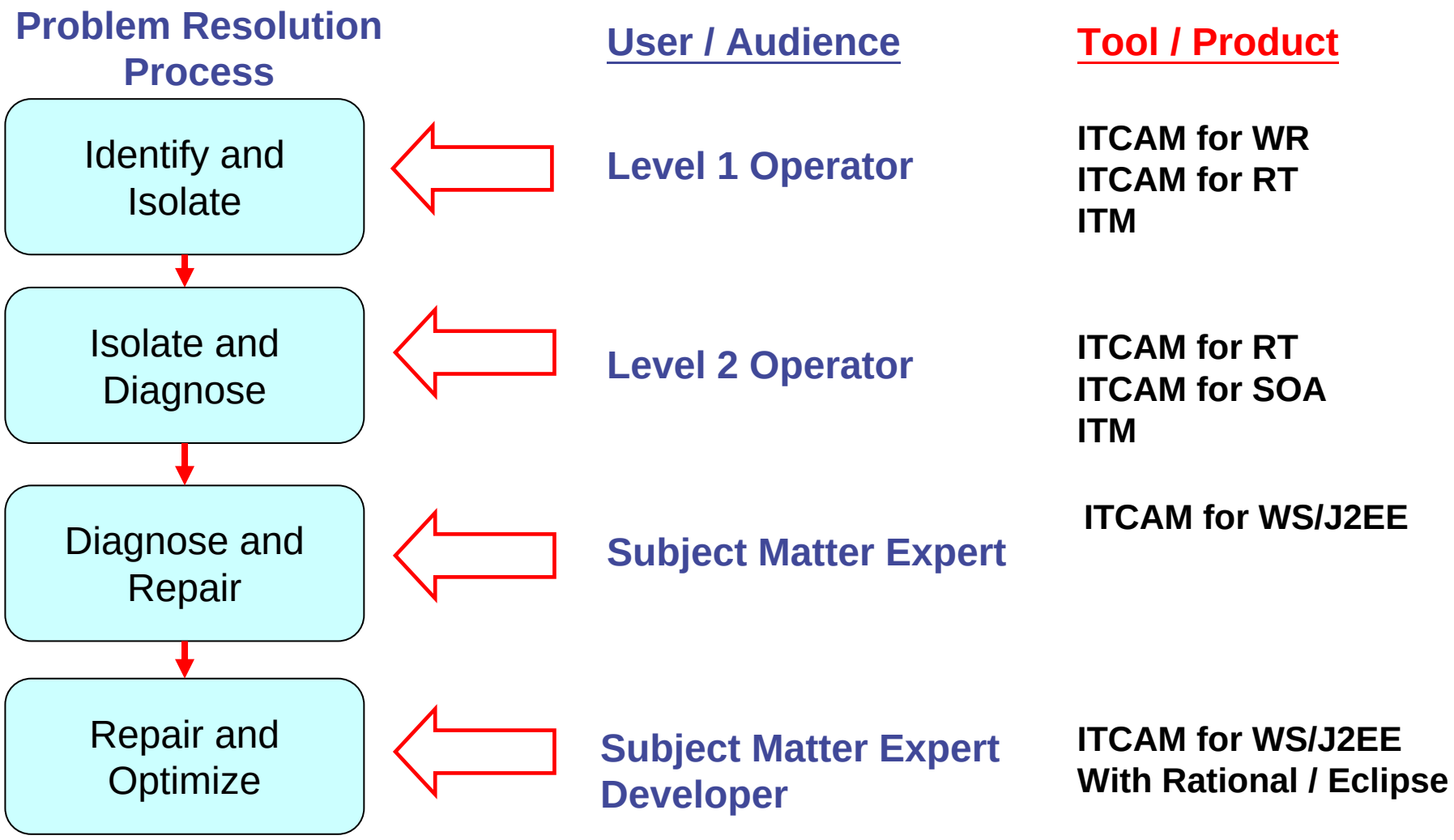
ITCAM Offerings – When to use and who to target



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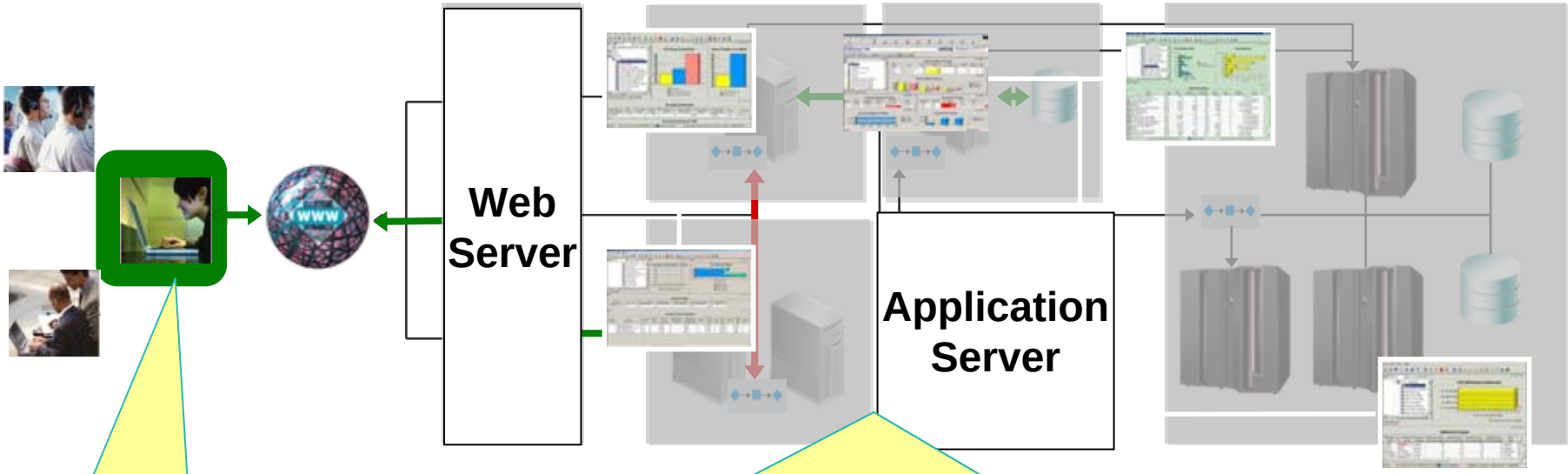
Monitor What is Most Important to Your Business Service – Application Resources



Application Health Monitoring

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ITCAM for Web Resources 6.2

Overview

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ITCAM for Web Resources

- **What is ITCAM for Web Resources?**
  - Provides IT Operations with resource and application monitoring to quickly identify, isolate, and route issues to the appropriate SME using the TEP user interface.
- **New Feature Highlights:**
  - **Application dashboard to view metrics per application**
  - **Simplified installation** (estimated time 1 hour)
  - **Workspaces for stand alone java applications**
  - **Best practices documentation for correlation of situations and logical views in TEP.**

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Supported Platforms & Workspaces

Application Servers

- WebSphere
- Tomcat
- JBOSS
- Weblogic
- Oracle
- SAP Netweaver

- Websphere ESB
- WebSphere Portal Server
- WebSphere Process Server
- Lotus Workplace Server

Web Servers

- Apache
- Internet Information Services (IIS)
- iPlanet

Application Server TEP Workspaces

- Application Health Summary
- Client Tier Analysis
- Application Tier Analysis
- Backend Tier Analysis
- Application Health History
- Application Configuration
- Server Health Summary
- Request Analysis
  - Datasources
  - JMS Summary
  - Web Applications
  - EJB Containers
- Pool Analysis
  - DB2 Connection Pools
  - J2C Connection Pools
  - Thread Pools
- Garbage Collection and Allocation Failure Analysis
- Cache Analysis
- Workload Management
- Web Services (WebSphere only)
- J2SE

Web Server TEP Workspaces

- Web Server Summary
- Active Server Pages (ASP)
- Web Sites

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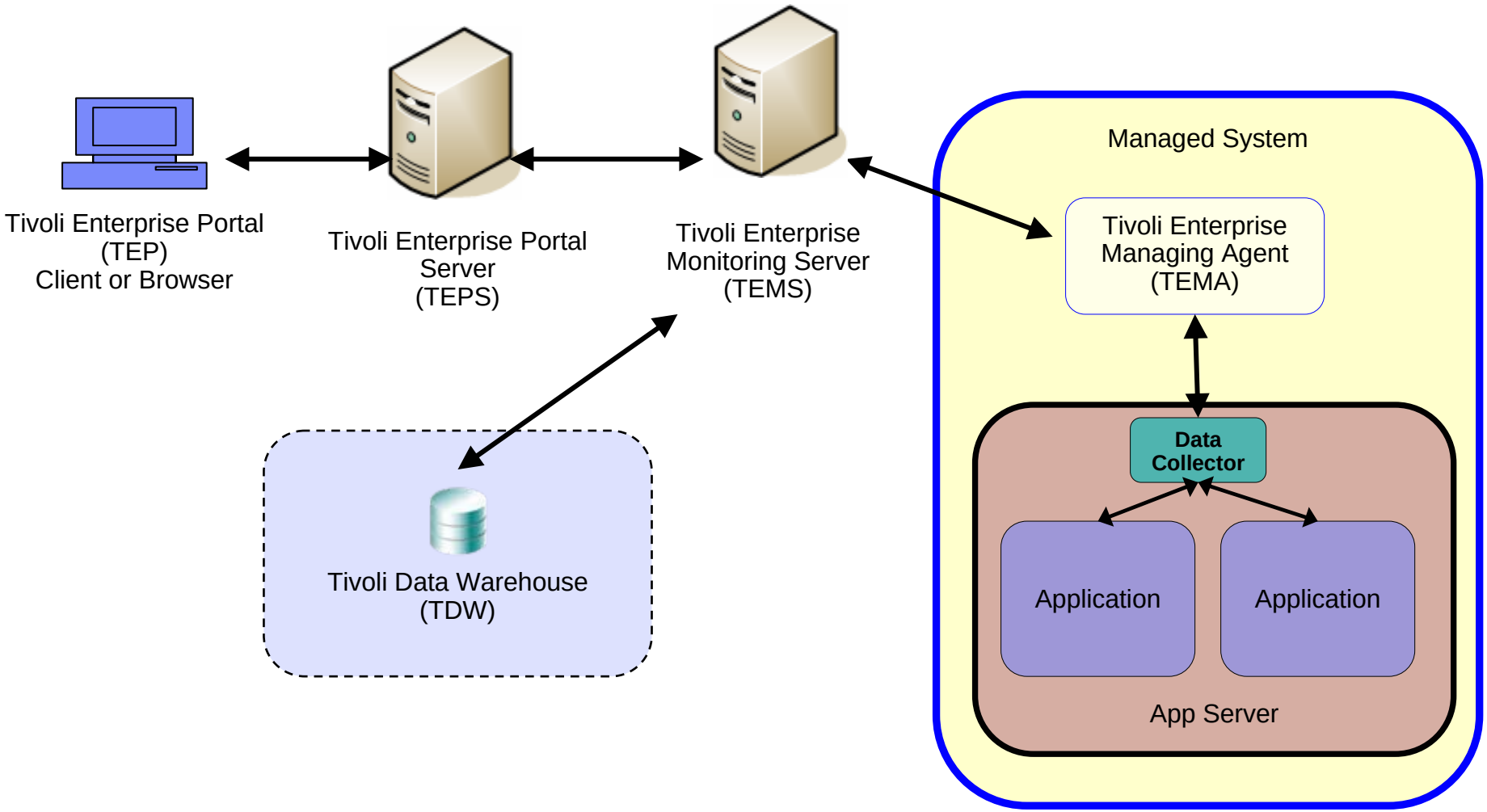
ITCAM for Web Resources Architecture



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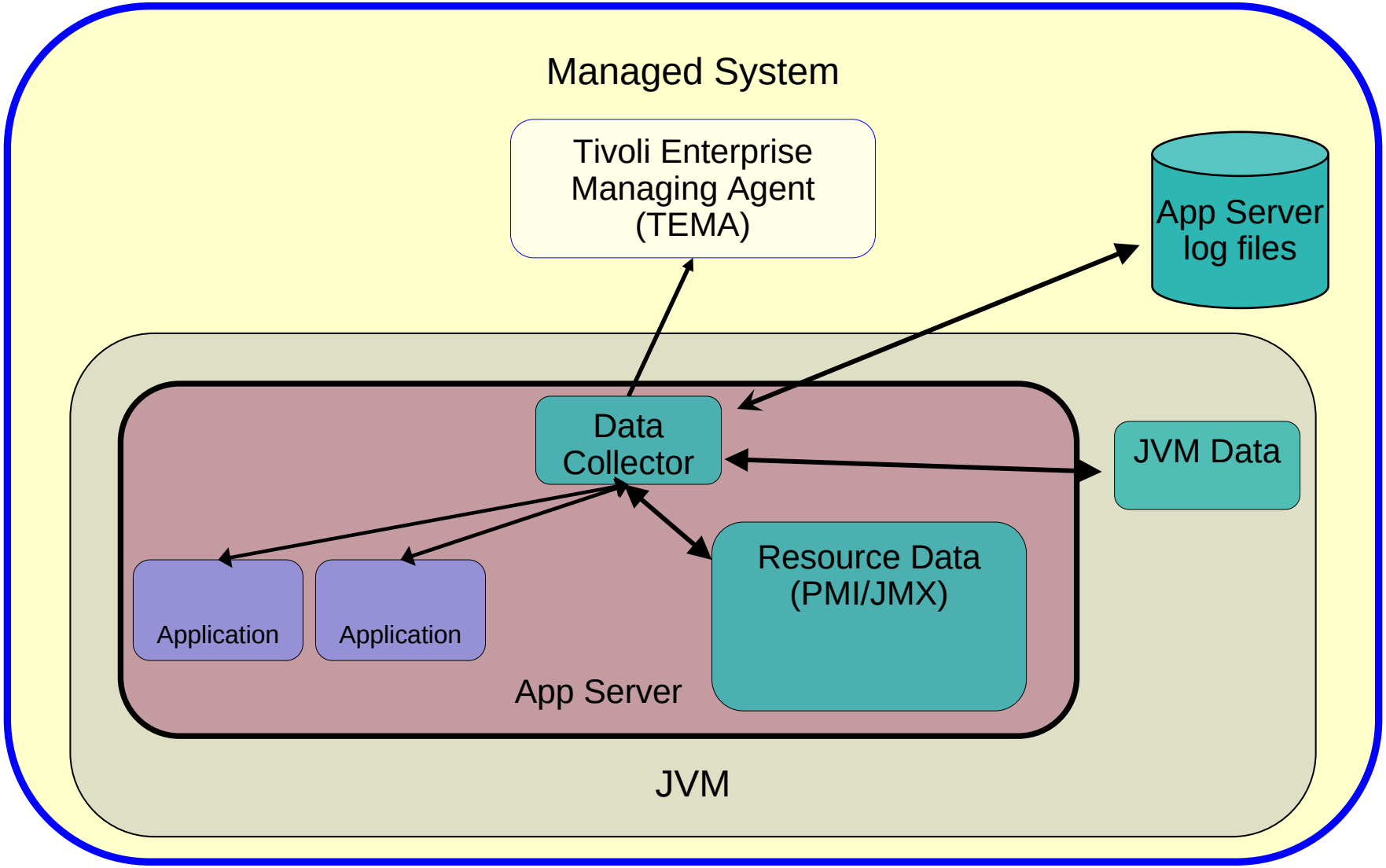
ITCAM for Web Resources Data Collection Architecture



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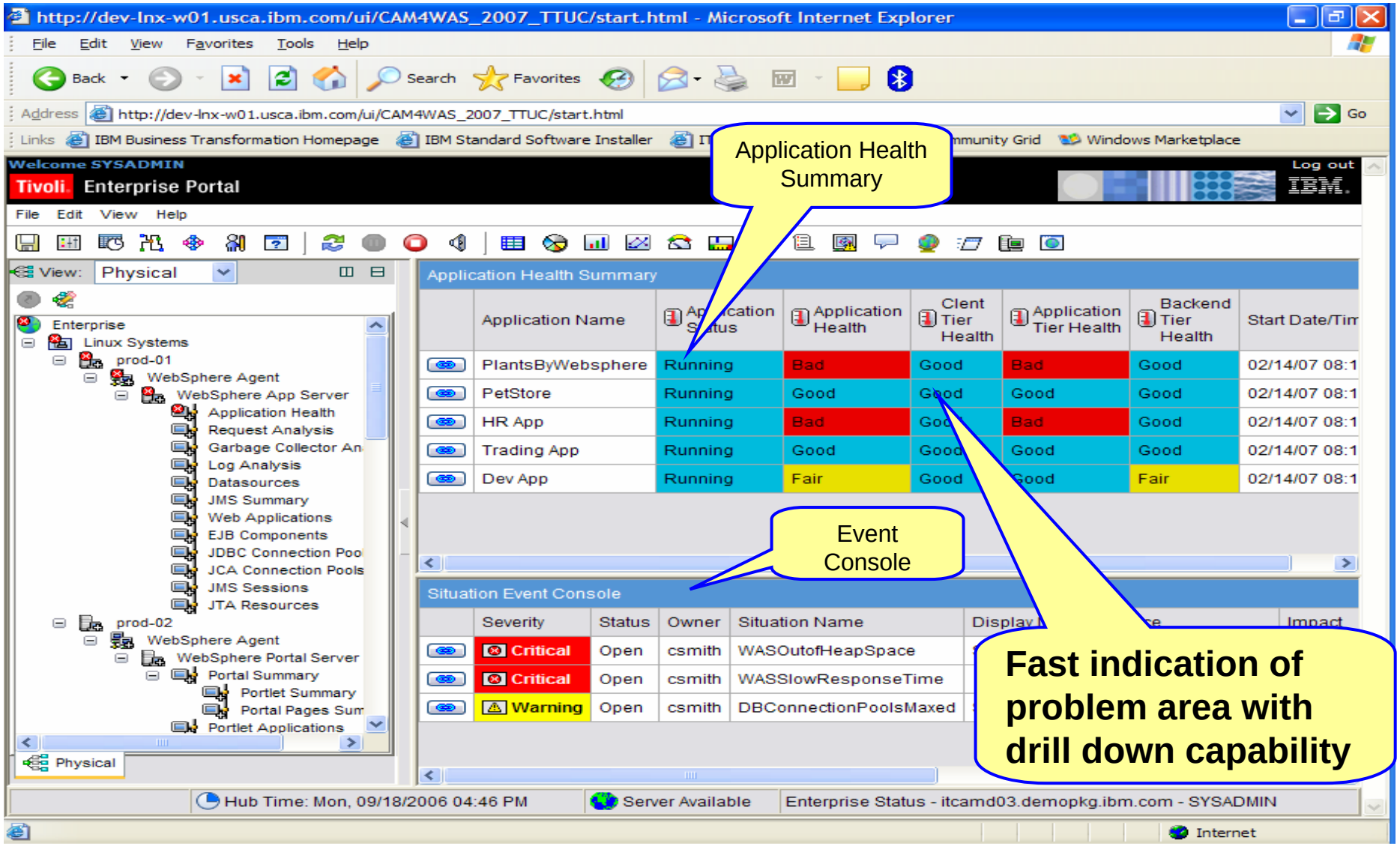
ITCAM for Web Resources: Application Dashboard



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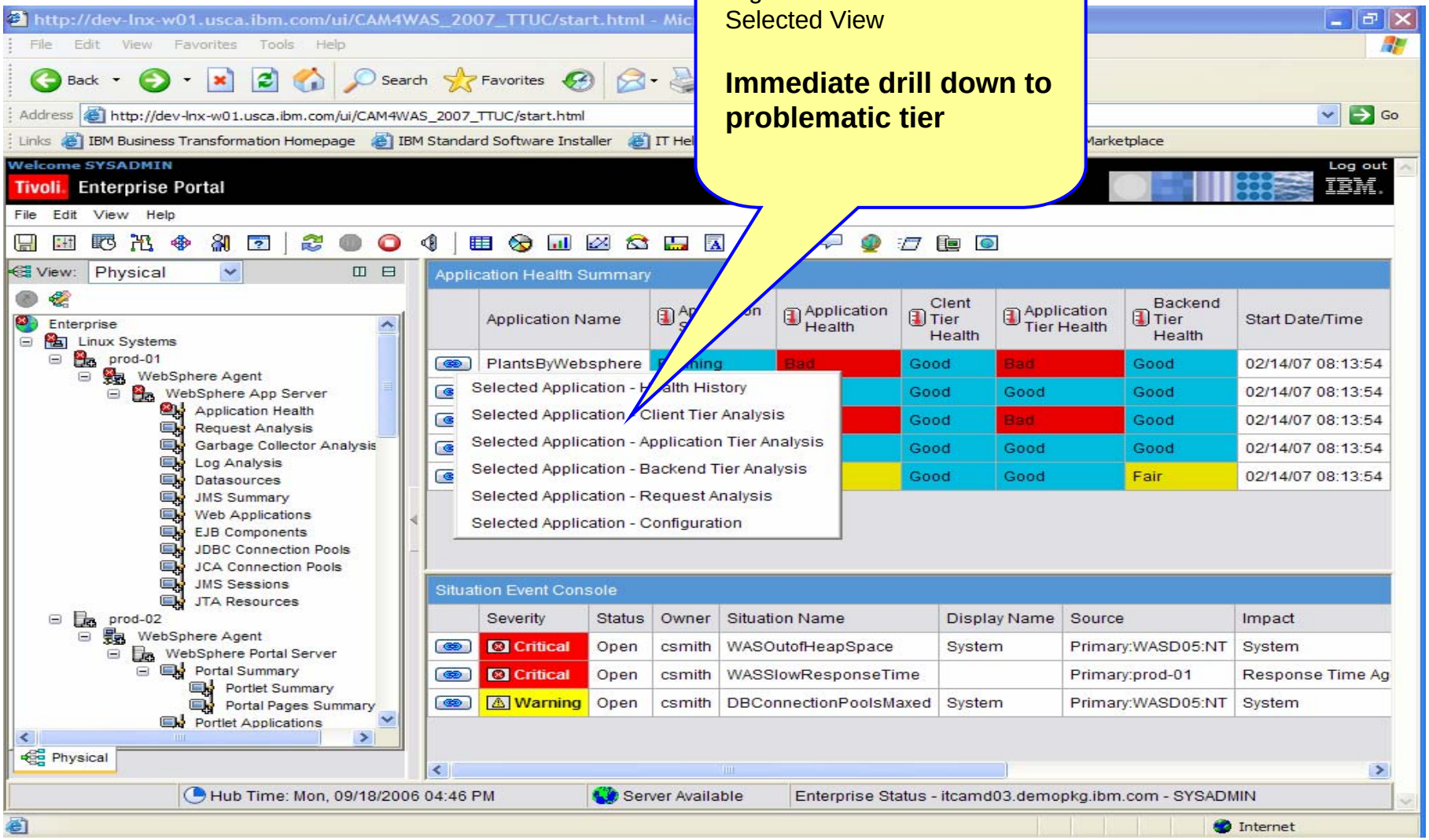
Dashboard Application Drilldowns



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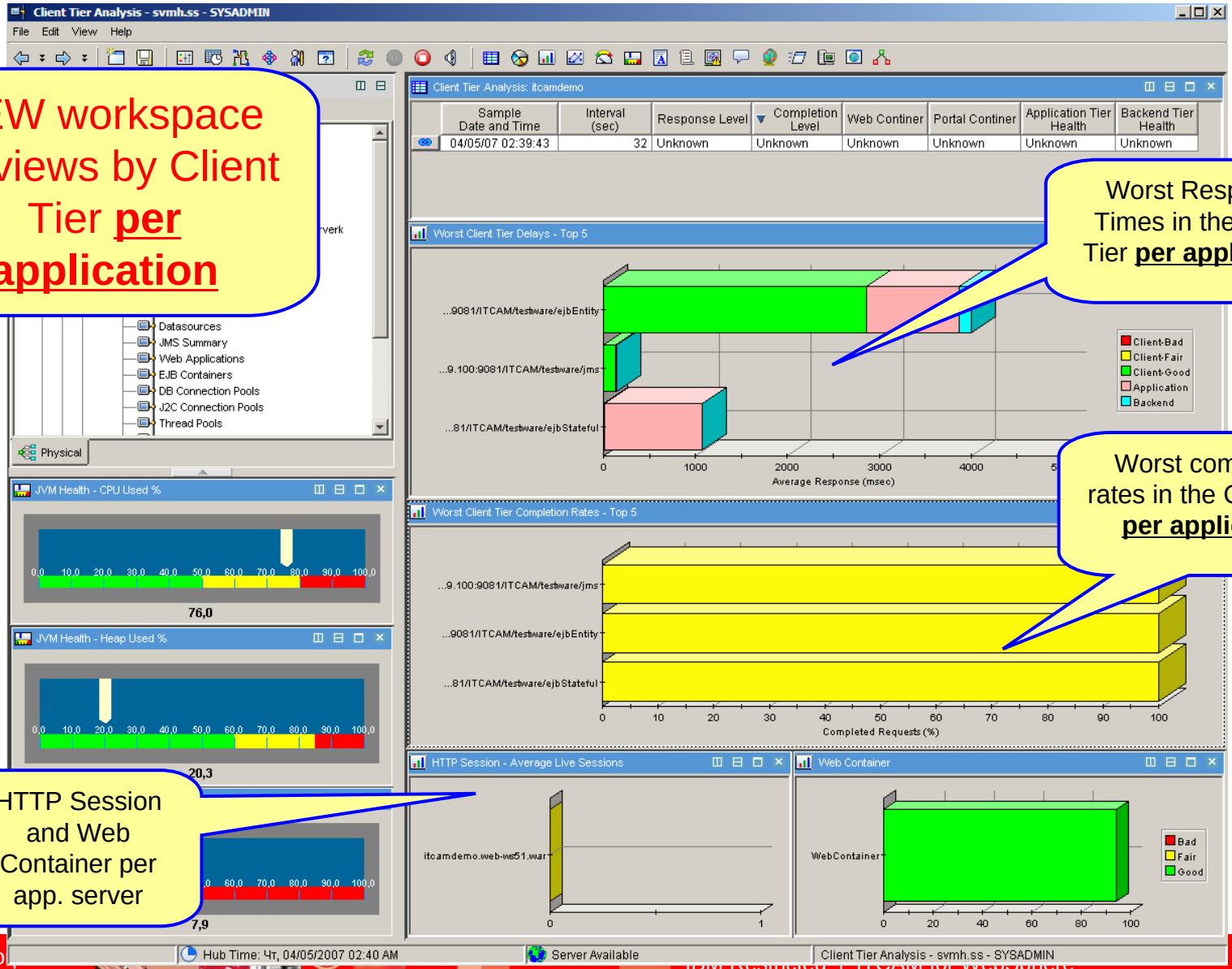
Drill Down to the Client Tier



NEW workspace for views by Client Tier **per application**

Worst Response Times in the Client Tier **per application**

Worst completion rates in the Client Tier **per application**

HTTP Session and Web Container per app. server

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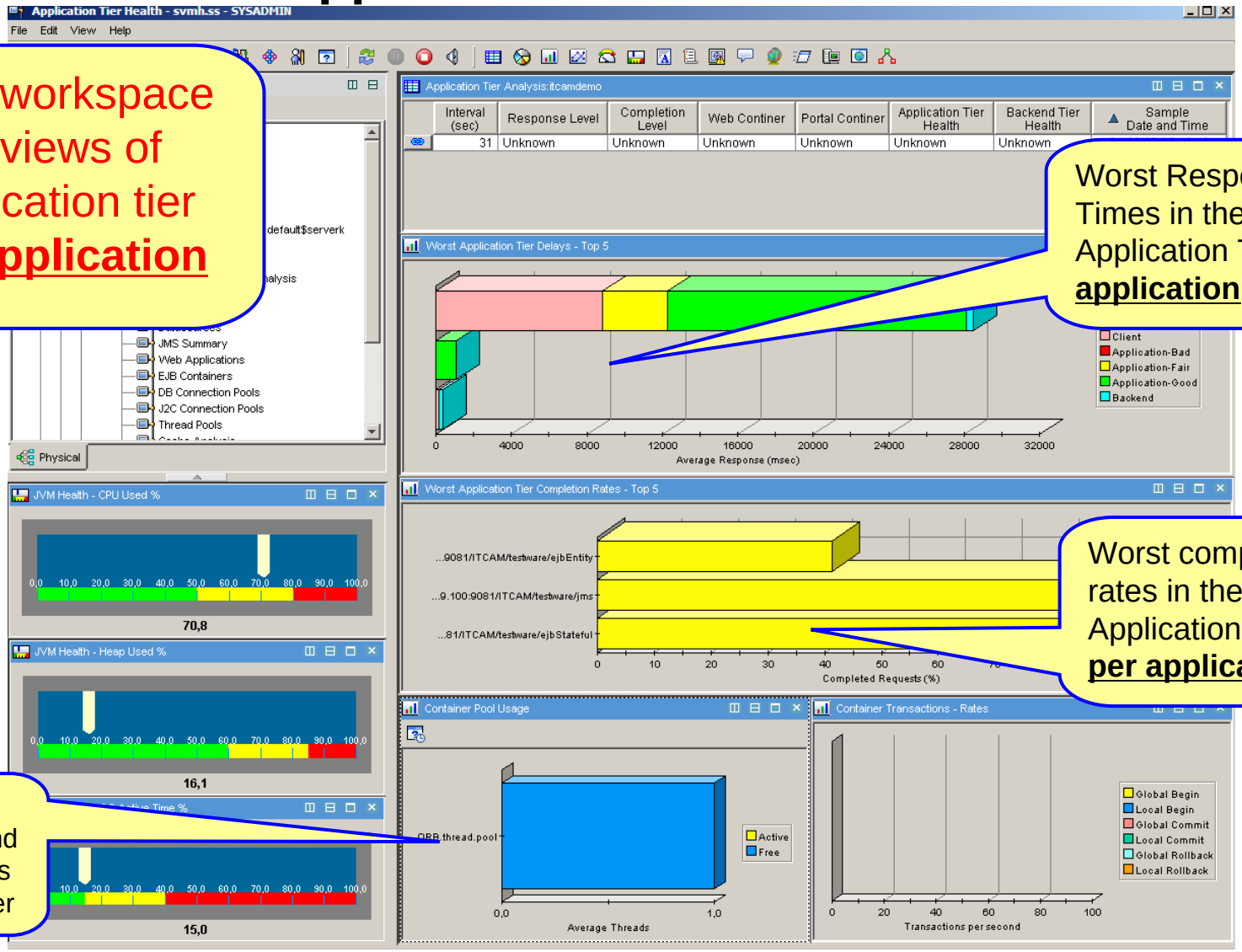
Drill Down to the Application Tier

NEW workspace for views of Application tier **per application**

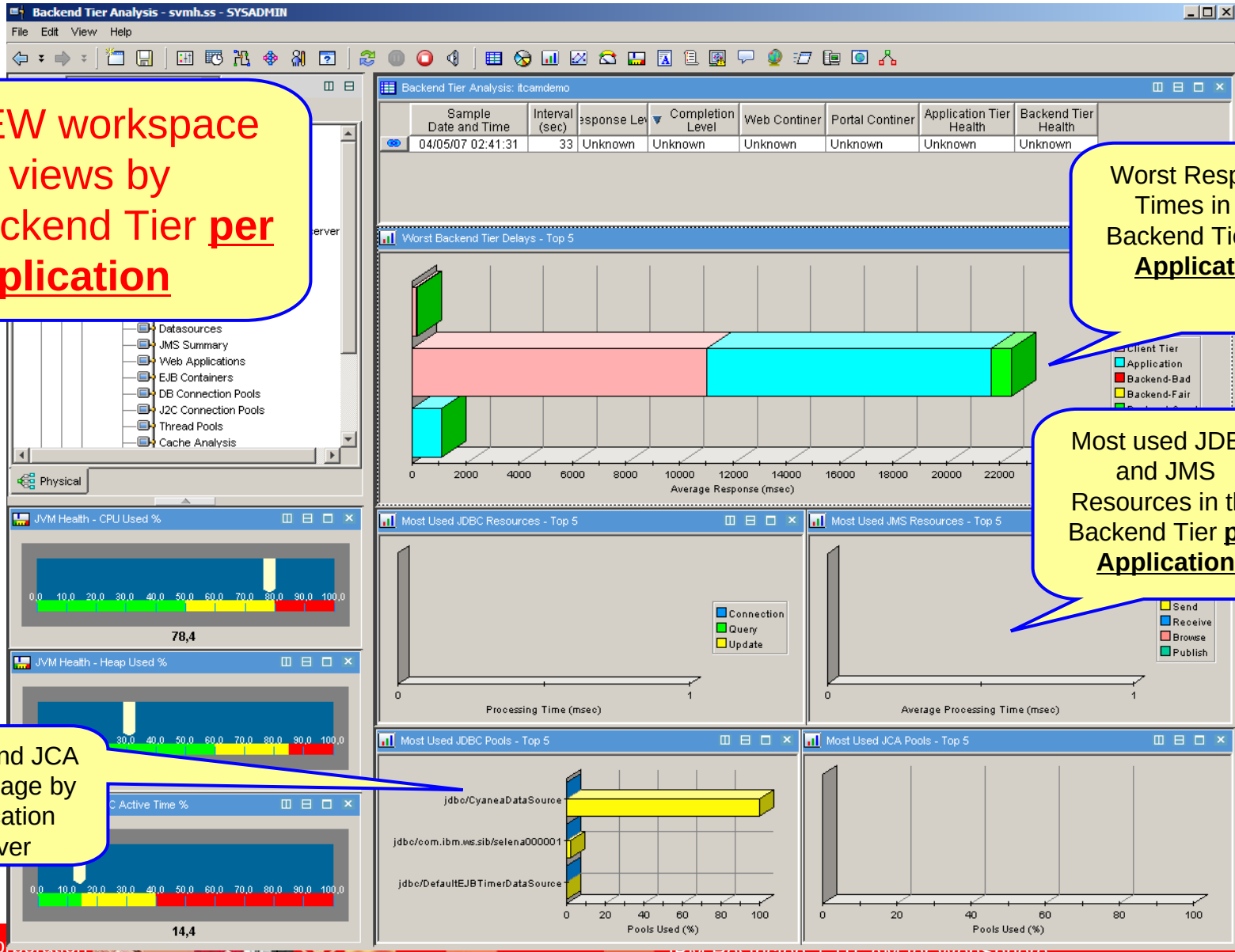


Worst Response Times in the Application Tier **per application**

Worst completion rates in the Application Tier **per application**

ORB Container and Transactions by app. sever

Drill Down to the Backend Tier



NEW workspace for views by Backend Tier **per application**

Worst Response Times in the Backend Tier **per Application**

Most used JDBC and JMS Resources in the Backend Tier **per Application**

JDBC and JCA Pool Usage by Application Server

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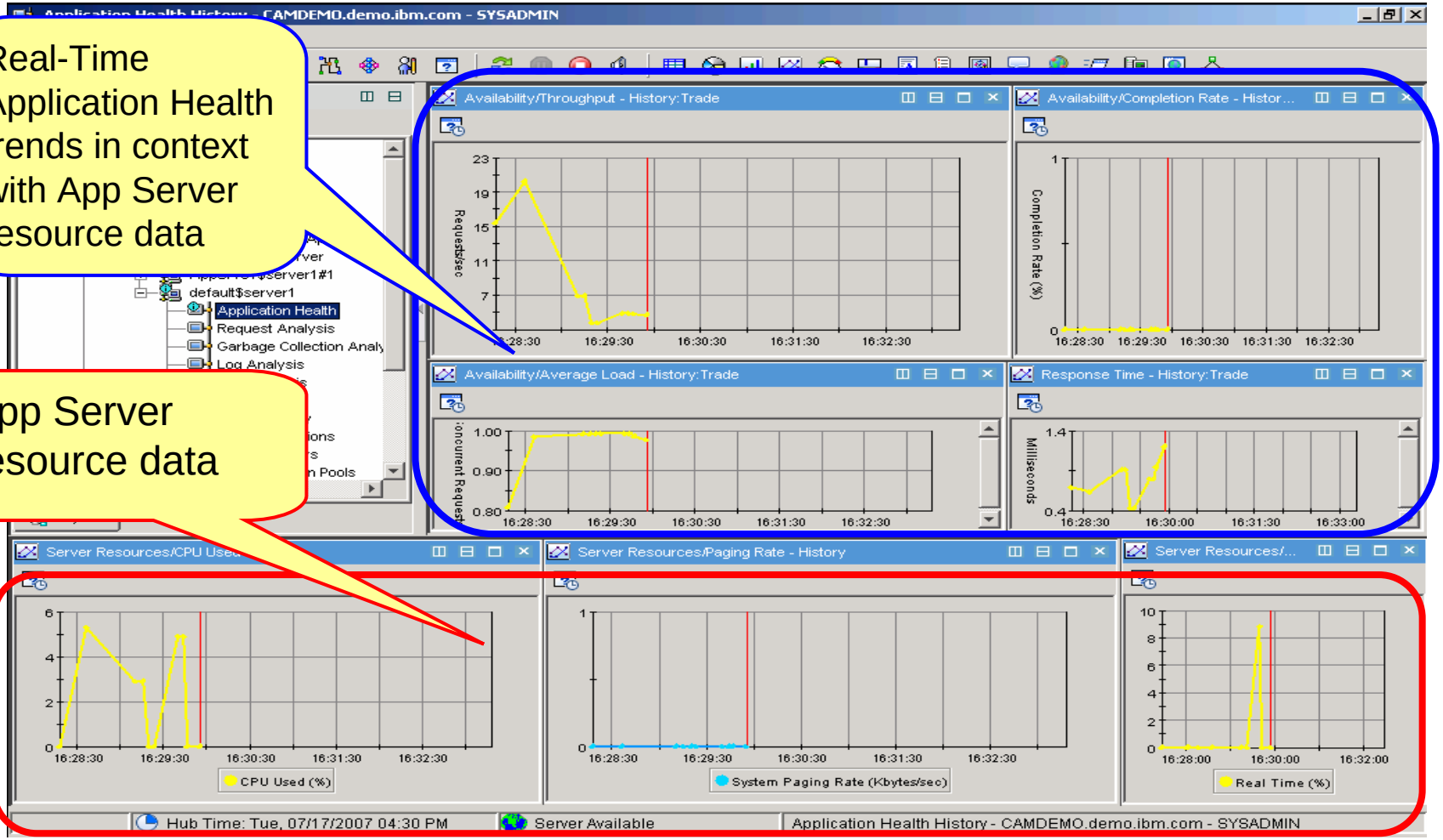
Consolidated View of Application & App Server Resources



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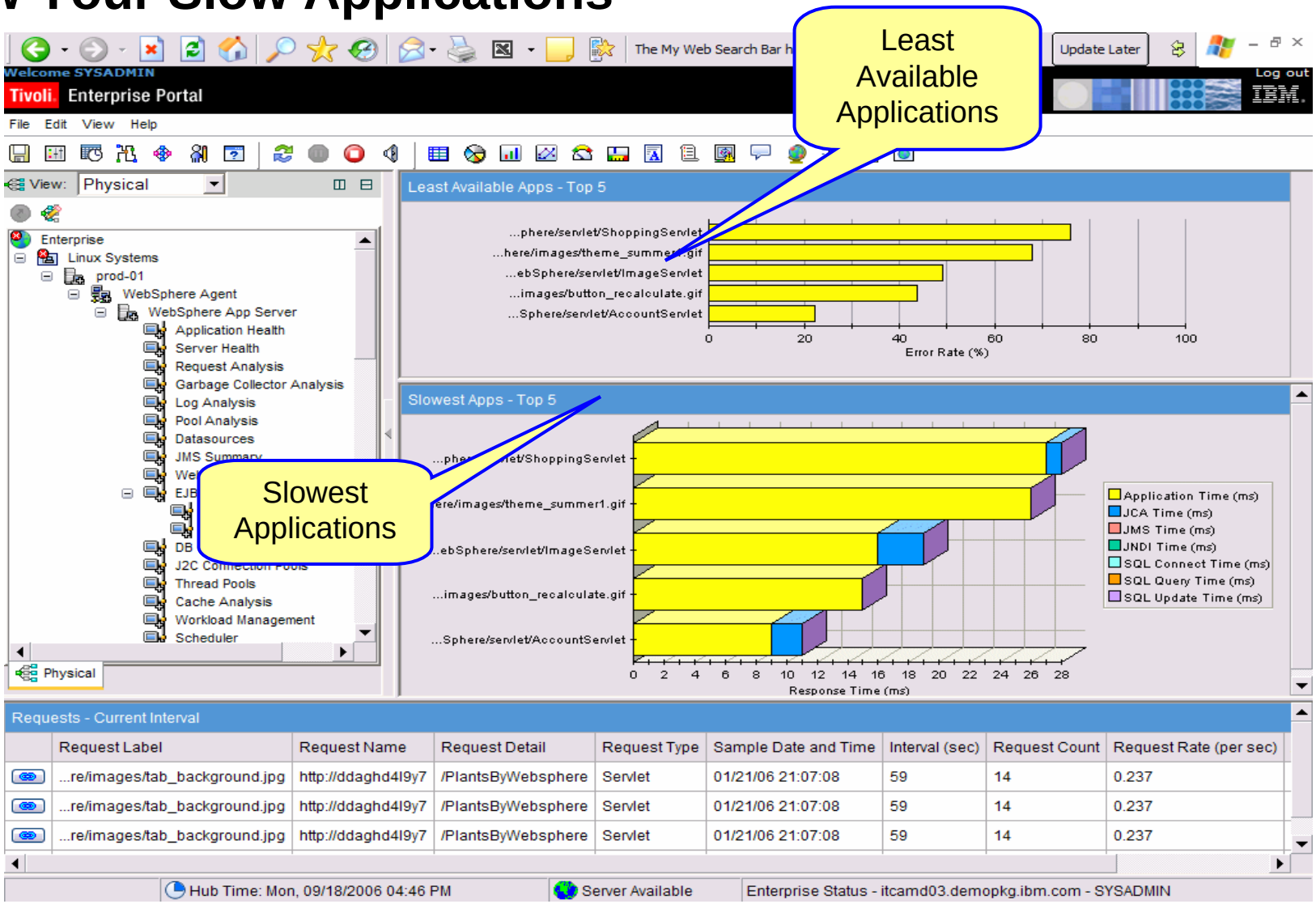
View Your Slow Applications



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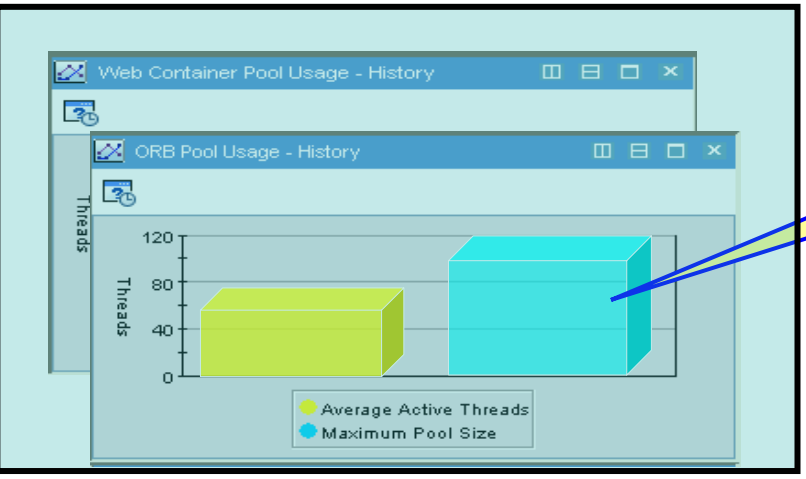
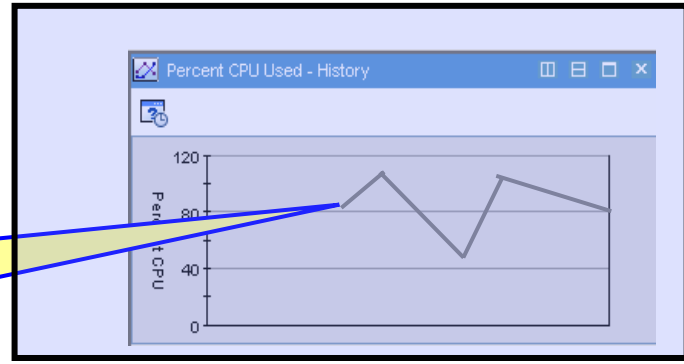
Pool Analysis Workspace

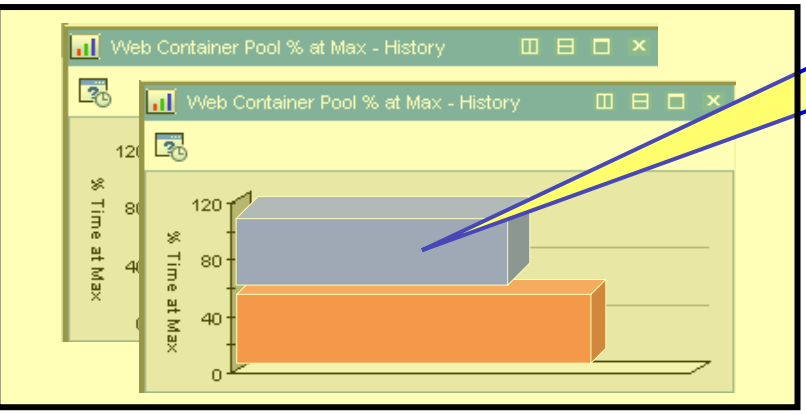
- J2EE resource pools are critical in terms of providing availability to commonly accessed services such as database access and other container pool types. This workspace tracks historical usage of the most important resource pools.



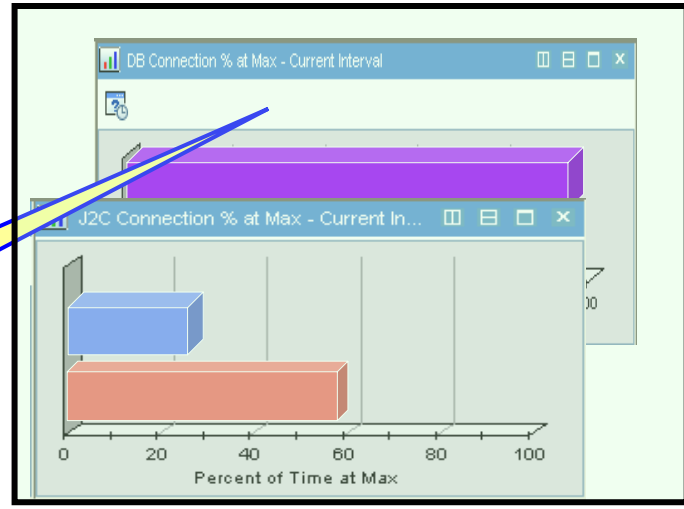
Comparison of recent active threads in ORB pool



Visual correlation of CPU utilization vs. pool consumption



Web container pool statistics showing # times at maximum capacity



DB2 and J2C connection pools at full saturation

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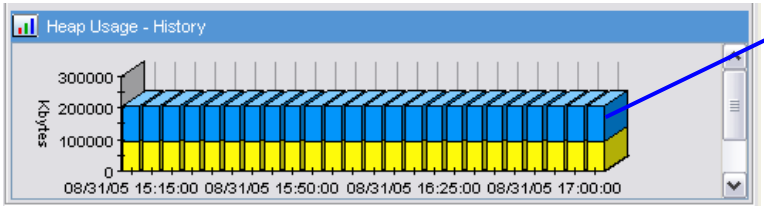
Garbage Collection Analysis Workspace

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 an complete analysis of GC performance metrics.

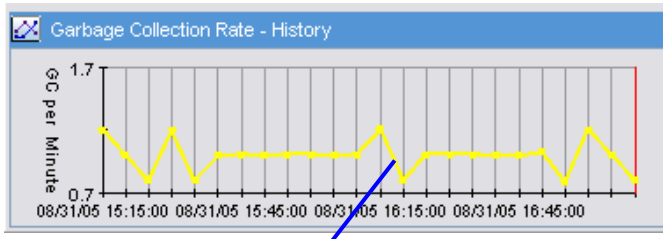


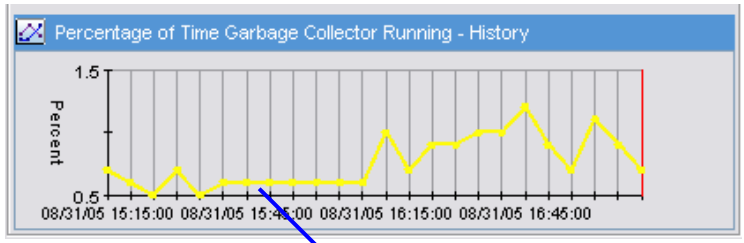
Recent JVM Heap Usage Trend

Detailed Analysis of Recent GC Performance

Garbage Collection Analysis

Sample Date and Time	Interval (sec)	Process ID	Times Run	Objects Freed	Objects Moved	Kbytes Total Freed by GC	Kbytes Used	Kbytes Used Delta	Kbytes Free	Real Time (ms)	Real Time (%)	GC Rate (per min)
08/31/05 17:14:00	59	78764	0	0	0	0	107339	15923	102440	0	0.0	0.000





Collection Rate - # GC's per Minute

% Time Spent in GC Cycle

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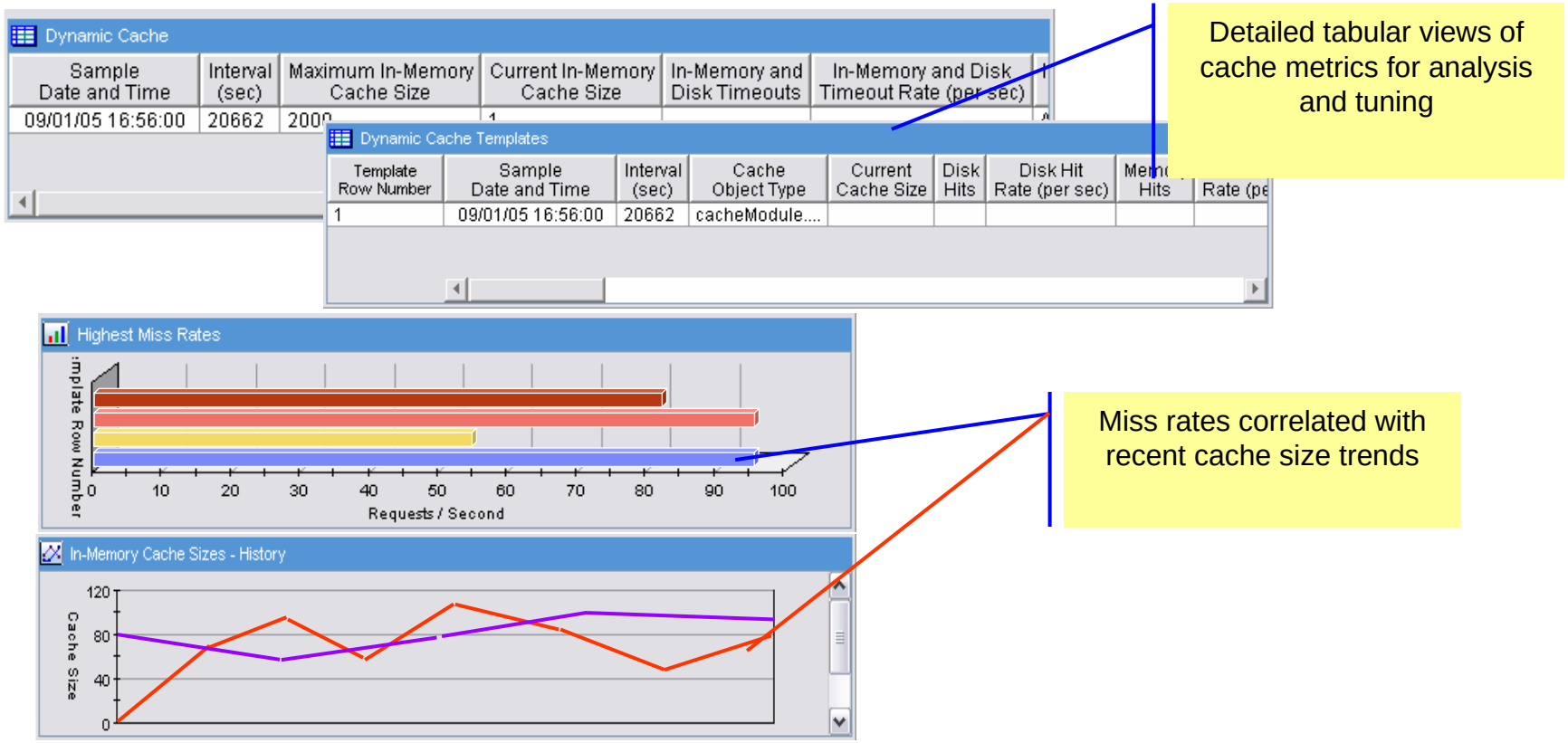
Cache Analysis Workspaces

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



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ITCAM for Web Resources 6.2

Integration with ITCAM for WebSphere/J2EE

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Integration with ITCAM for WebSphere

Monitor Health

Diagnose Problem

- **ITCAM for Web Resources** monitors application and application resource health
  - Provides operator level data and actions
- **ITCAM for WebSphere / J2EE** diagnoses individual application components for root-cause analysis
  - Perfect for Subject Matter Experts / Developers / Architects
- **ITCAM for Web Resources and ITCAM for WebSphere** share a number of components and integrate very well
  - Easily add Deep Dive Diagnostics to ITCAM from Web Resources with a seamless upgrade to ITCAM for WebSphere / J2EE.
  - Easily add improved ITM functionality of ITCAM for Web Resources to ITCAM for WebSphere/J2EE with a seamless upgrade of the 6.1 ITM agent.

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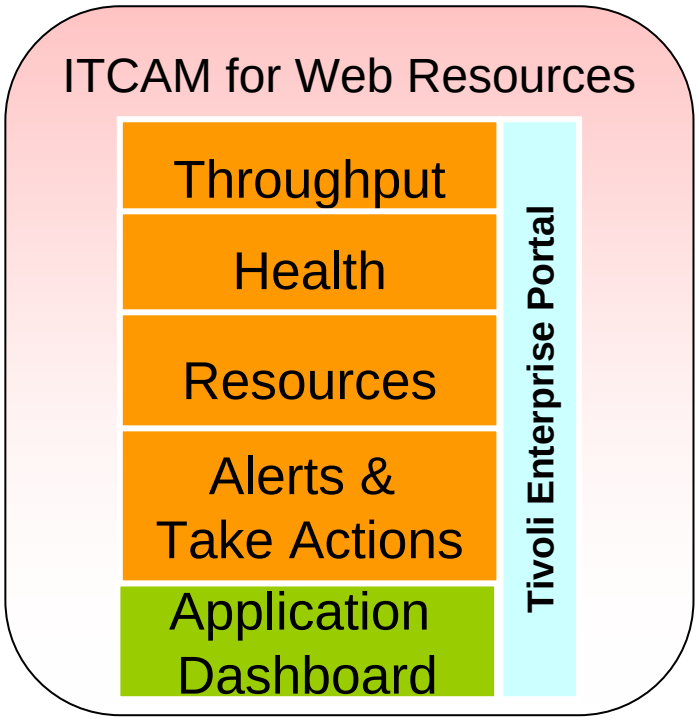
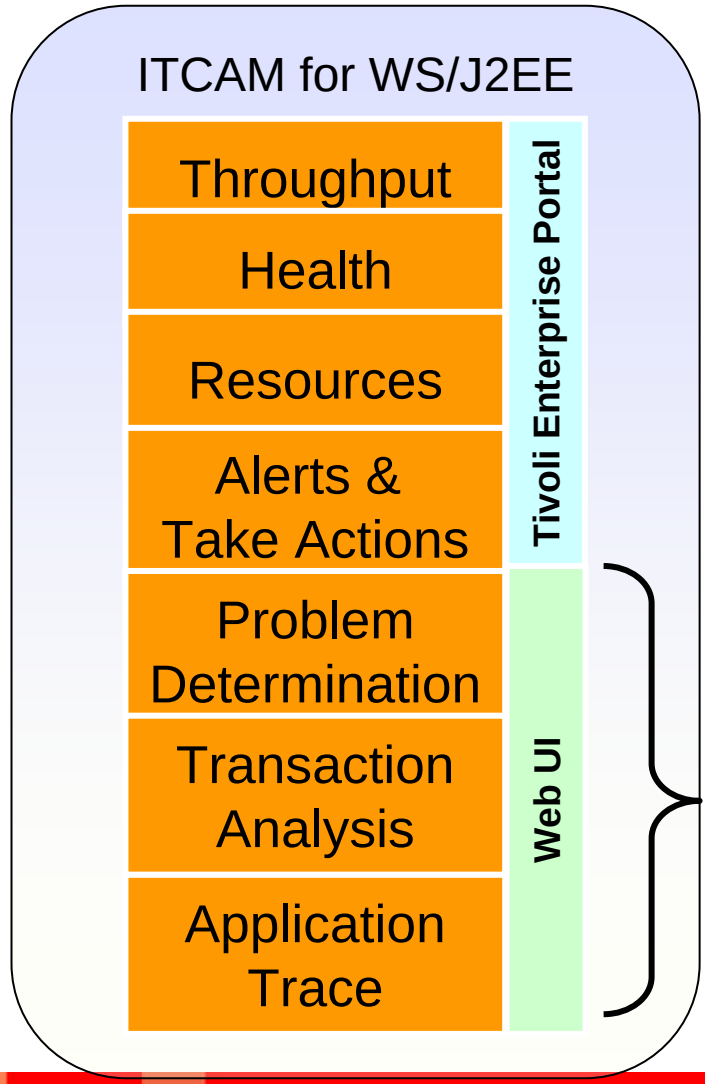
ITCAM for Web Resources & ITCAM for WS/J2EE

Operator

SME/Developer





'Deep dive' diagnostic capabilities

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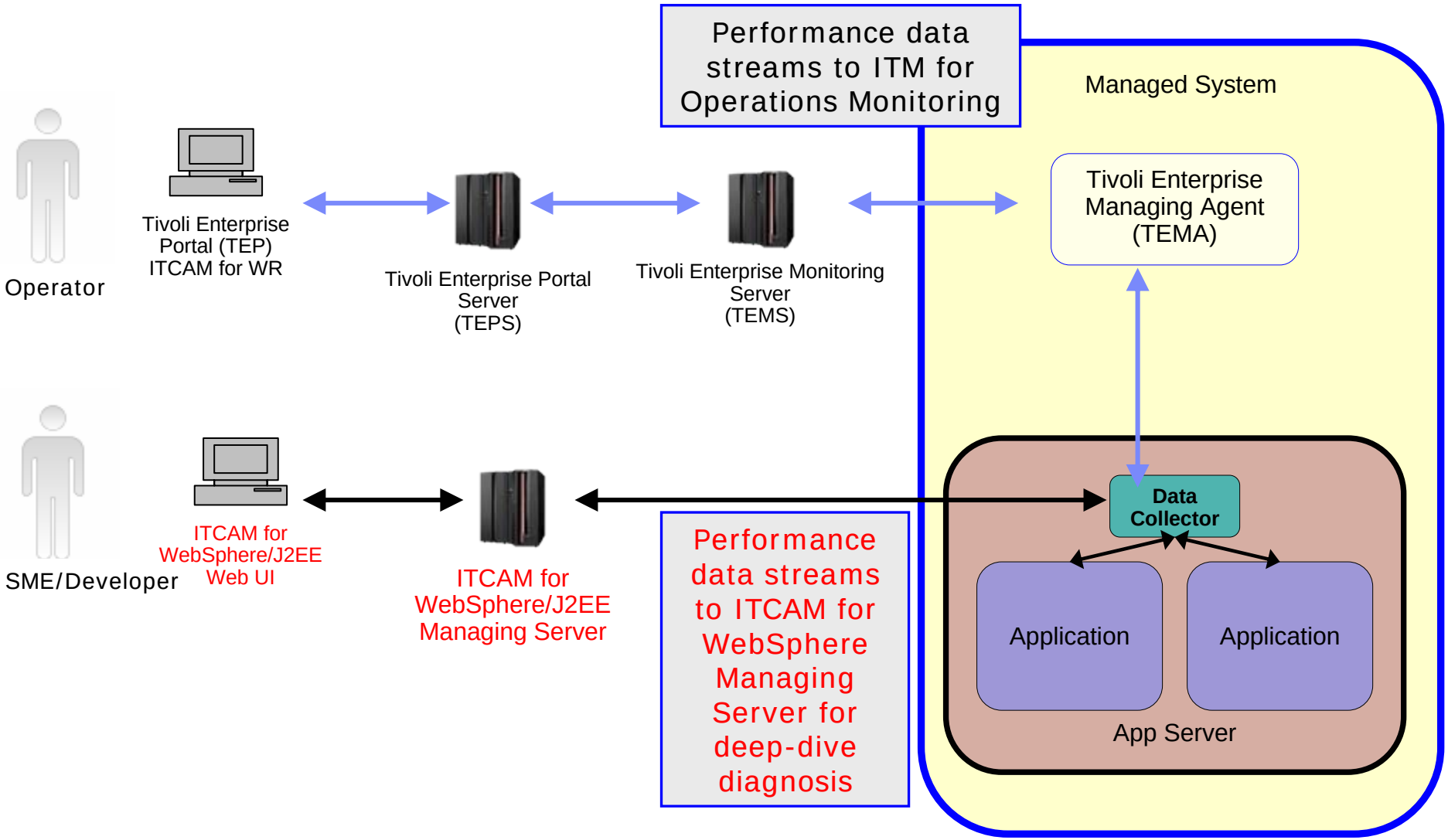
ITCAM for Web Resources & ITCAM for WebSphere/J2EE



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ITCAM for SOA

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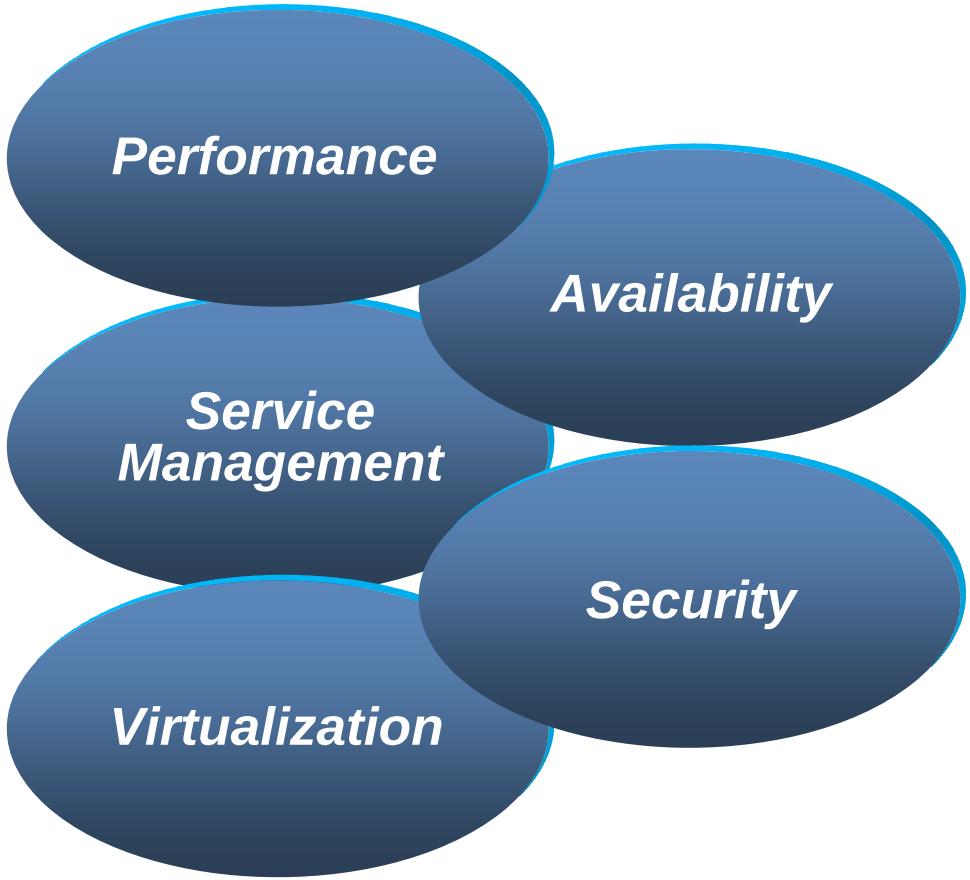
How Does SOA Impact Infrastructure and Management?

SOA Characteristics

- Applications reused in new dynamic ways
- Services combined from multiple sources
- Rapid deployment
- Services route to any available resource
- Distributed access

Key Infrastructure and Management Considerations



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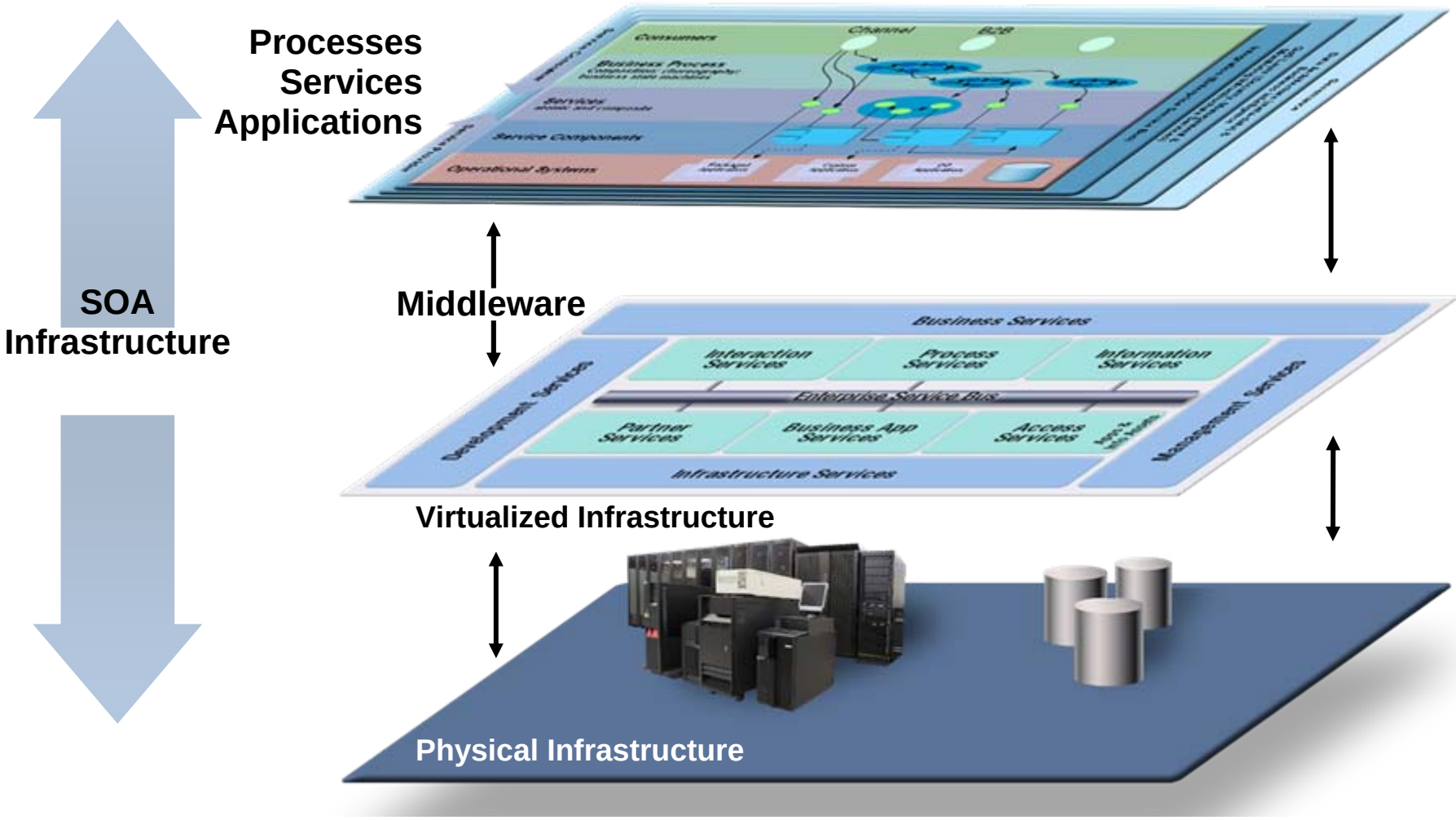
SOA and Layers of Abstraction



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SOA Management – Visibility, Control and Automation

Increasing capability and maturity of SOA Infrastructure

Visibility: Service Monitoring

- Monitor services end to end to isolate and fix problems
- Performance management across all services
- Availability management for supporting applications

IT Operations

Control: Identity & Access Control

- End-to-end identity propagation from silos to services
- Control access levels to services with trusted identities
- Consistently enforce security policies for services

IT Security

Automation: Autonomic and Virtualized

- Integrated infrastructure for runtime automation
- Leverage SOA flexibility for adapting to changes automatically
- Leverage virtualized environment for maximum efficiency

Smart IT via Dynamic SOA

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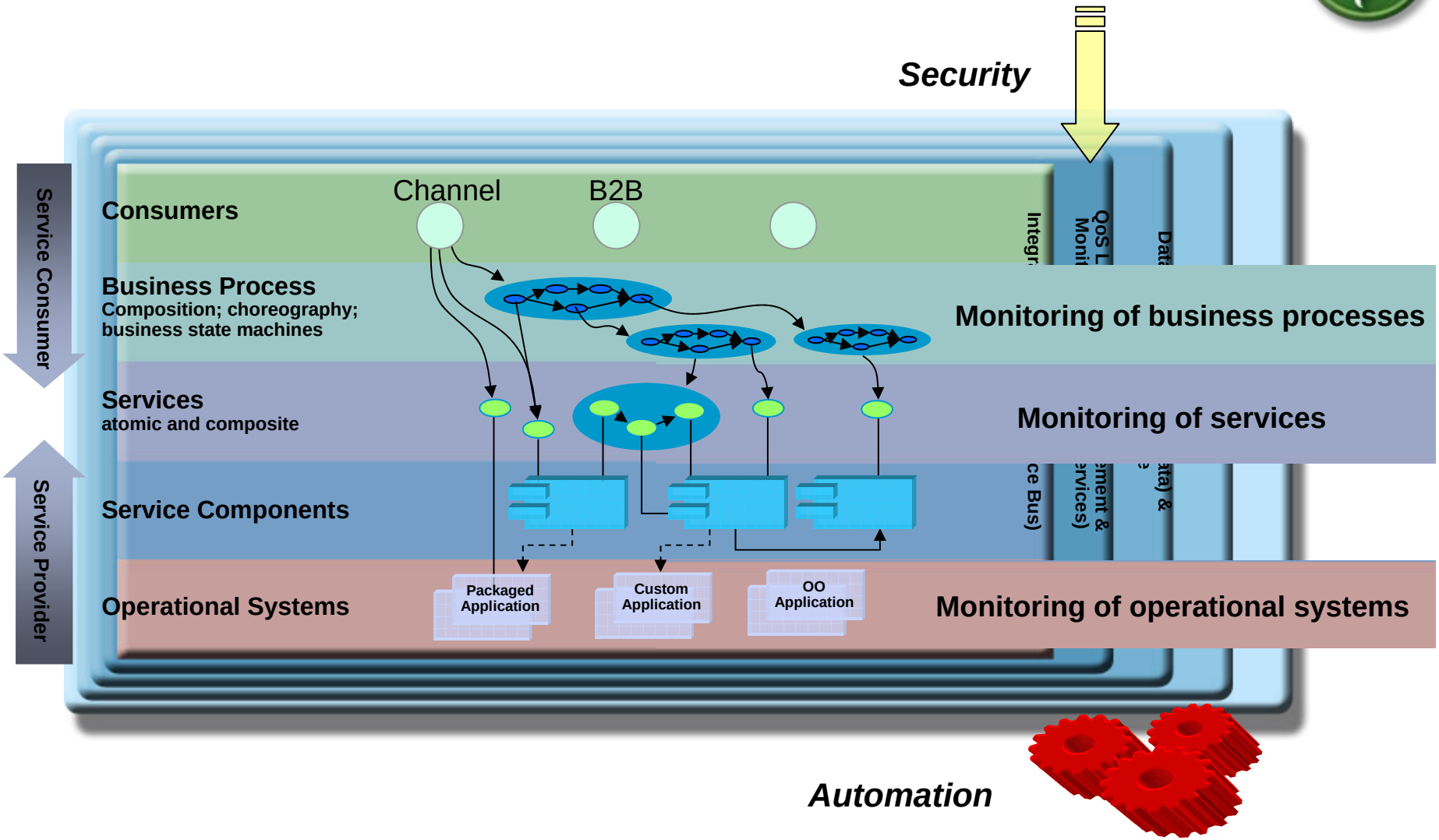
Key Requirements from SOA Reference Architecture Perspective



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What capabilities are required for a SOA Management Solution?

Remember to effectively manage the following are in addition to the normal IT process and Infrastructure management capabilities

- ***Service as a resource*** – Ability to manage service as a resource
- ***Discovery*** - Discover runtime service invocations, service flows, service dependencies and cross reference with registered services for compliance. Discovery should also include application, application environment, application resources and their dependencies
- ***Performance Monitoring*** – Monitor service performance, faults, resource usage
- ***Service Level Monitoring*** – Ability to measure service levels and be able to correlate with business service and present in business dashboards
- ***Track service requests / transactions*** as it traverses the different application tiers or service components
- ***Service Security*** – Services must be secured and should have the ability to handle federated identities
- ***Automation & Virtualization*** – Ability to handle virtualized environment with on demand reconfiguration (e.g. routing) and provisioning
- ***Seamless IT Operations and Development bridge*** - for reduced Mean Time to Resolution (MTTR) of service problems

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ITCAM for SOA

- What is ITCAM for SOA?
  - A Tivoli monitoring solution that supports a broad range of heterogeneous SOA platforms, including WebSphere. ITCAM for SOA provides tooling for all aspects of SOA life-cycle management including architecture, development, testing, monitoring, management, and governance of services.

- New Feature Highlights:
  - Support for WebSphere Message Broker
  - Support for Apache AXIS
  - TEP integrated service-to-service topology view
  - Service monitoring views by requestor

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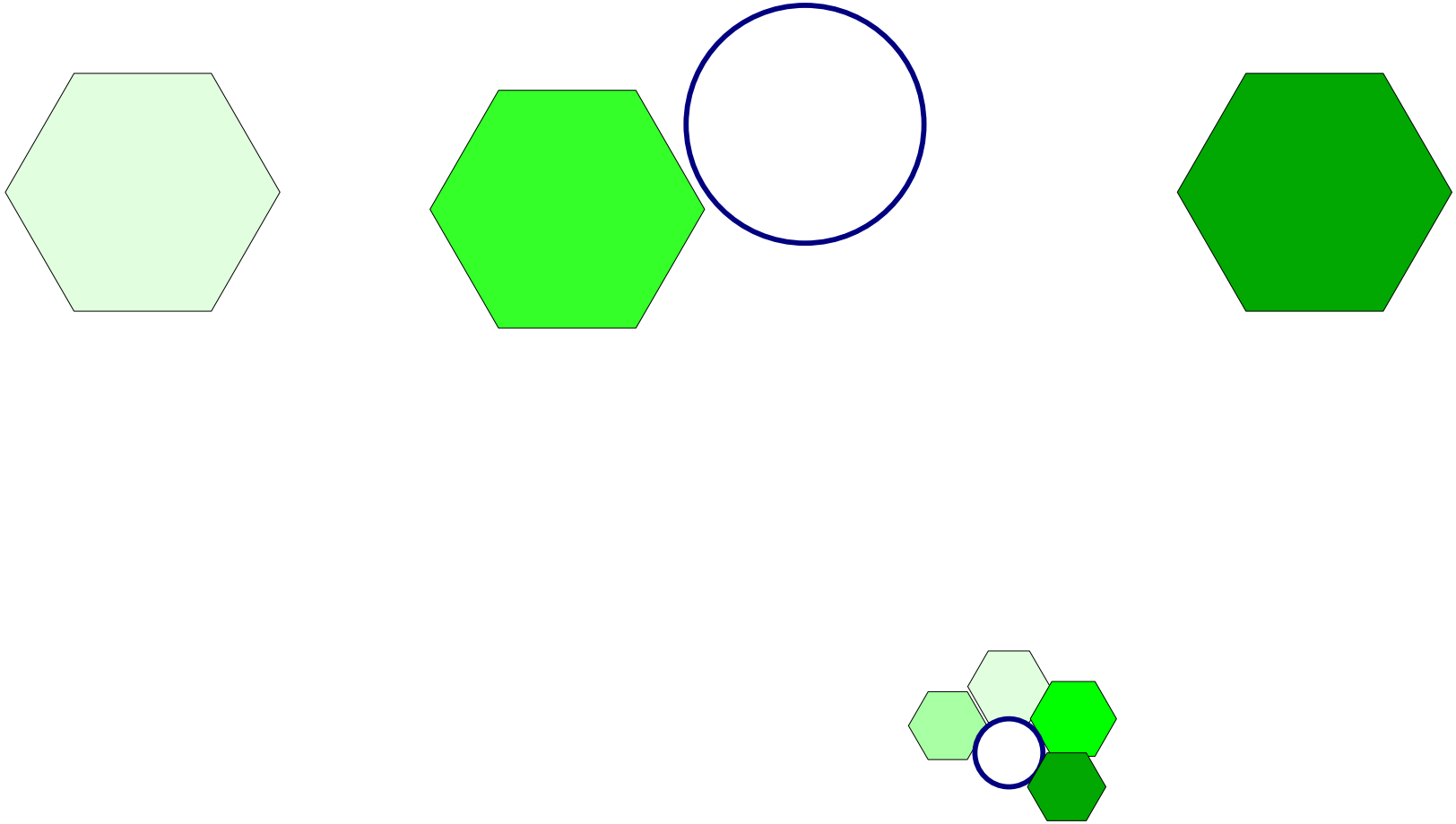
SOA Management – Key Capability Requirements



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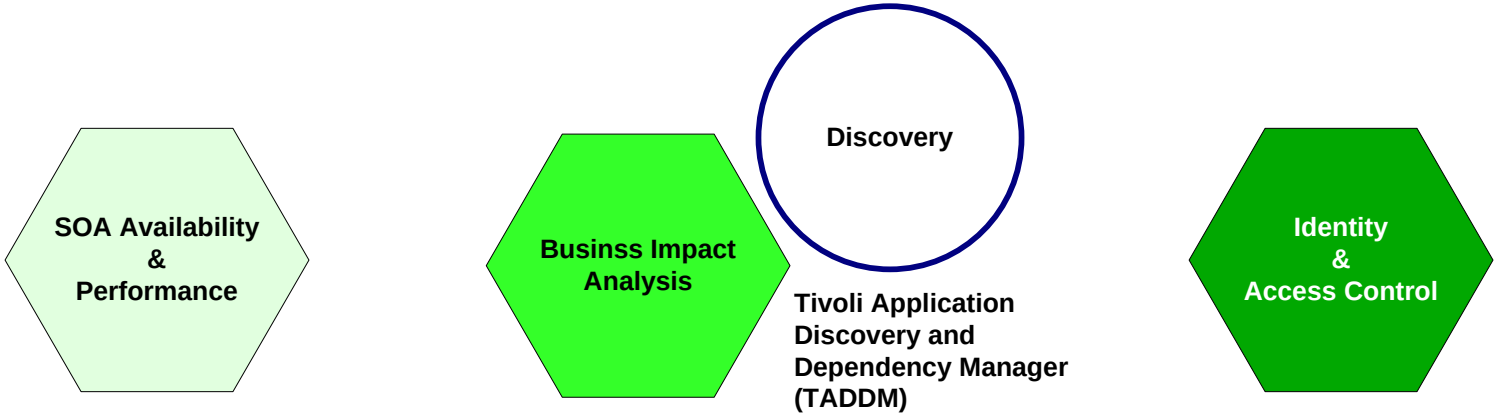
An Example – IBM Tivoli Solution Proposals



Tivoli Application Discovery and Dependency Manager (TADDM)

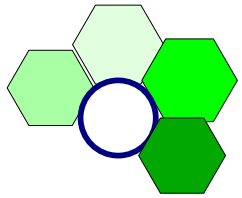
Tivoli Business Systems Manager (TBSM)

ITCAM for SOA
ITCAM for Web Resources
OMEGAMON XE for Messaging
Optional *- End User, Resource and Diagnostic solutions (Refer – Application Availability and Performance Management Solution)*

Tivoli Federated Identity Management (TFIM)
Tivoli Access Manager

Phase 1 ***Phase 1, 2*** ***Phase 1,2,3***

SOA Management Solution
Suggested Solution Proposals



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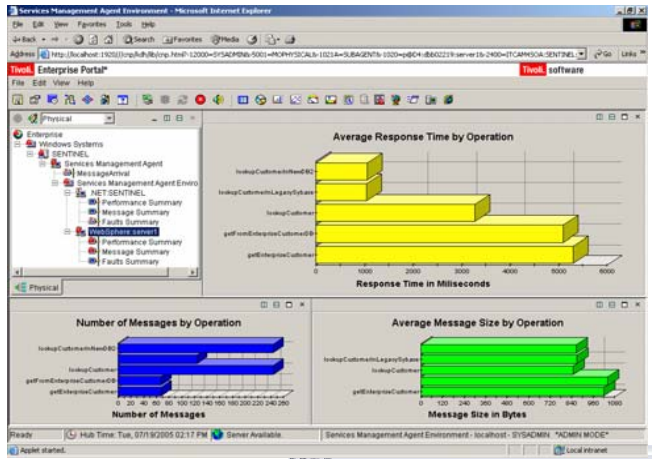
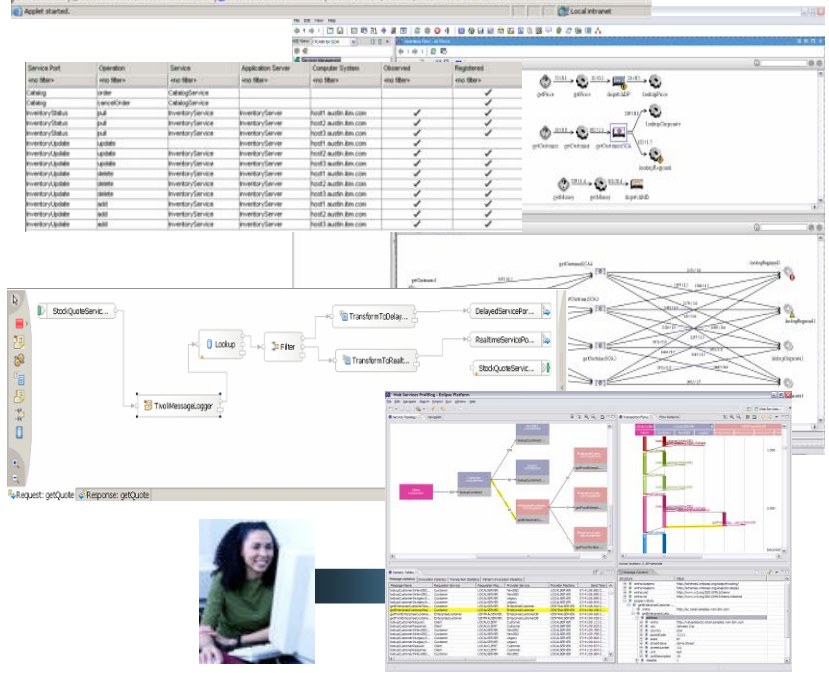
IBM Tivoli Composite Application Manager for SOA

- **Service problem identification & resolution**
  - Content-rich views, topology and cross-workspace linkages enable drill-down from services to application components and IT resources to identify the source of bottleneck or failure
- **Service Management Automation**
  - Built-in and extensible alerts, situations, workflows enable powerful automation scenarios
  - Managed mediation primitives for WebSphere ESB enable control of services
- **Heterogeneous SOA Platform Support**
  - SOA Platform support covers IBM WebSphere Application Server, WebSphere ESB, WebSphere Process Server, WebSphere DataPower, WebSphere Message Broker, Microsoft .NET, JBOSS, CICS, SAP and BEA WebLogic
- **Integrated Console**
  - Service views, alerts and automation included within Tivoli Enterprise Portal, the integration point for ITCAM, OMEGAMON, ITM and TBSM
- **Life-cycle Management**
  - Web Services Navigator provides deep understanding of service flows and relationships
  - WebSphere Service Registry and Repository integration supports SOA Governance
- **Support for ISM strategy**
  - Discovery Library Adapters add discovered Service information to CCMDB
  - Additional DLAs provided for BPEL and WSRR



IT Operations



Web Services Expert

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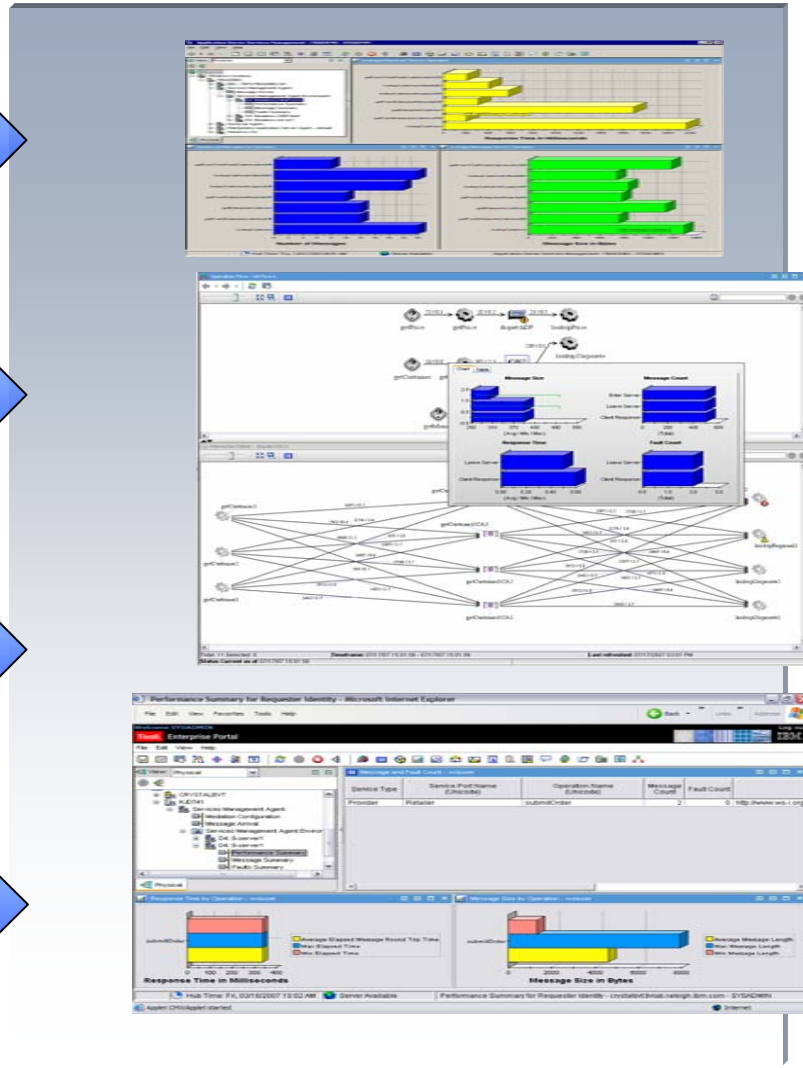
ITCAM for SOA 7.1 : "Simple, Straight-forward, Clear understanding of your SOA"

- Enhanced Platform support
  - CICS TS 3.2, WebSphere Message Broker

- Services To Services Topology support
  - Provides new visuals and aesthetics for the services to services relationship
  - Aggregate metrics on the relationship
  - Operation status
  - Operational flow
  - Support for all monitored containers
  - Link from the topology views to other Tivoli solutions

- Provide views based on Service Requesters
  - Track performance based on requesting client, A client could be a user id or the remote IP address of the invoking client

- Dynamic TEP workspace linkages for faster, more accurate problem determination
  - In context relationships and linkage to:
    - Omegamon XE for Messaging
    - ITCAM for Web Resources
    - ITM for Operating Systems
    - Other ITCAM for SOA workspaces



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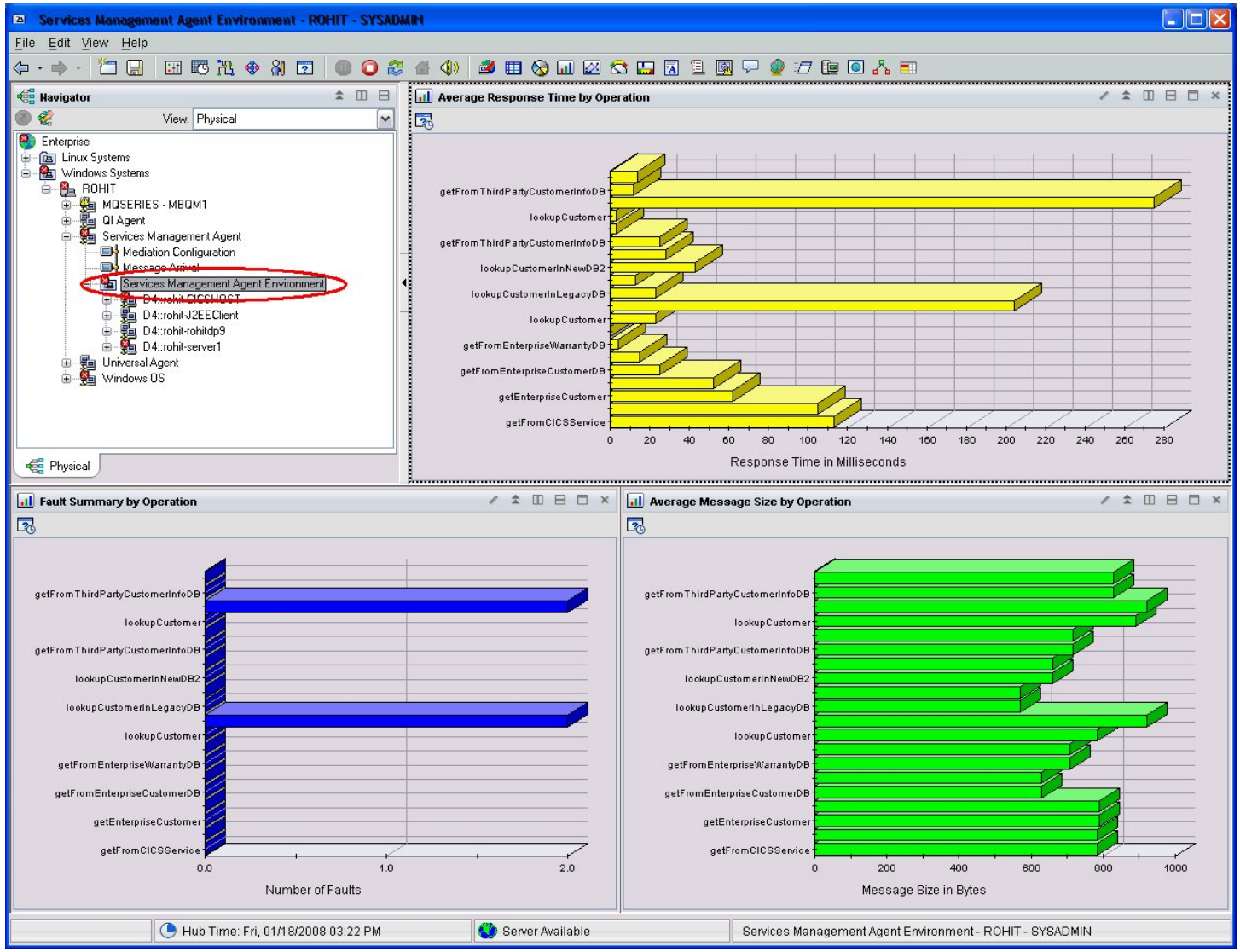
Services Management Agent Environment



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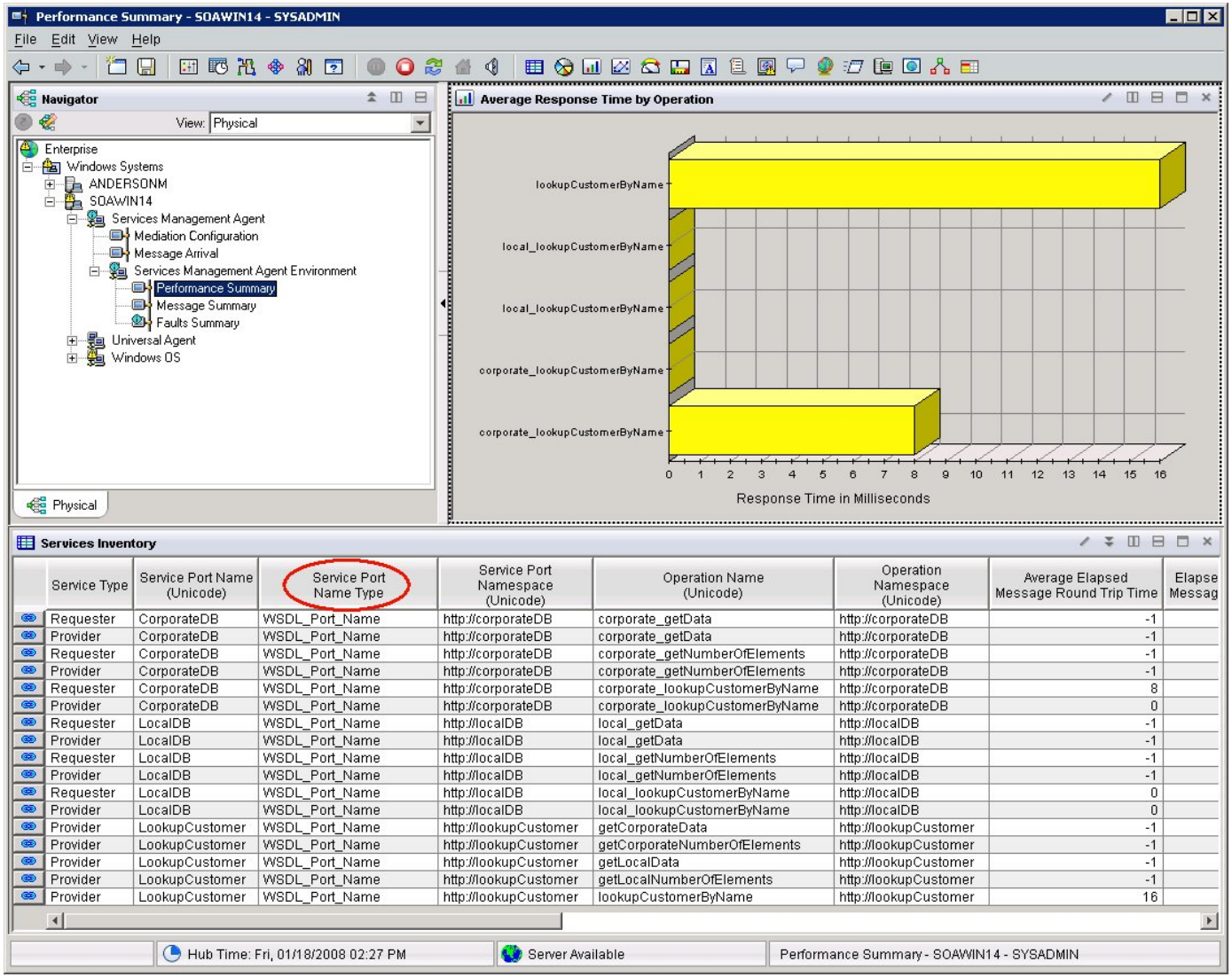
Performance Summary



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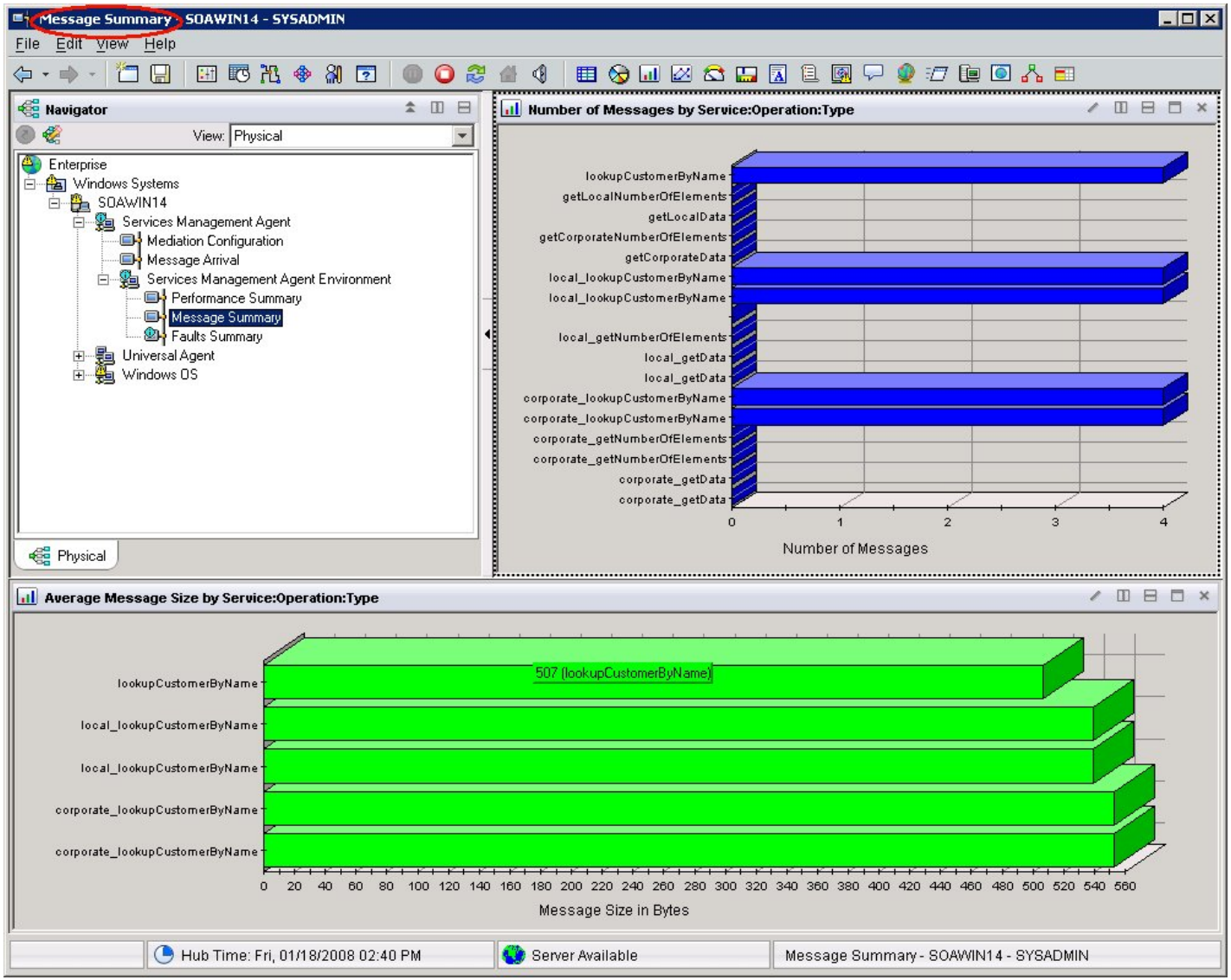
Message Summary



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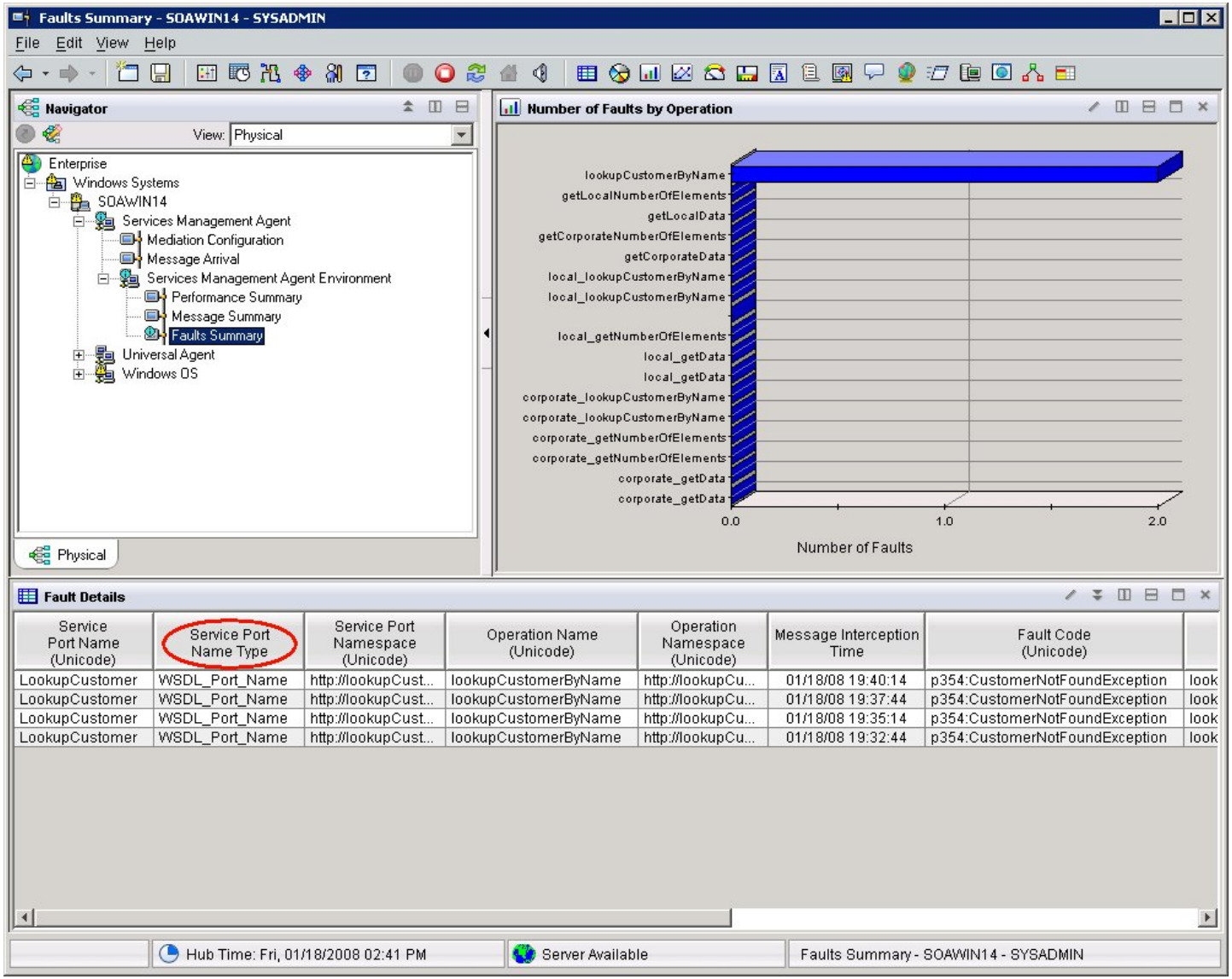
Faults Summary



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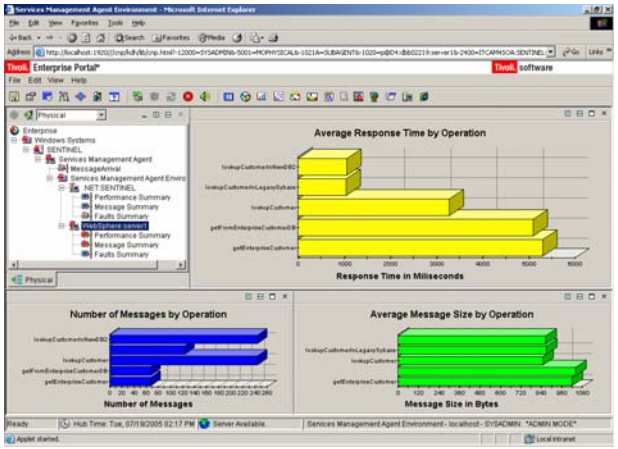
Assist the Service Developer by Integration with Rational and WebSphere tools

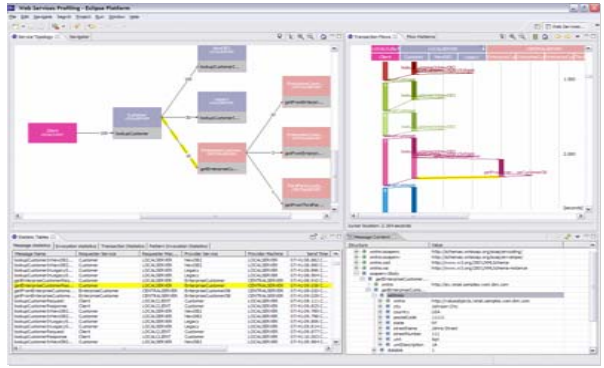
Tivoli operations view



Tying Operations to Development

Production data dynamically, remotely pulled from Tivoli Data Warehouse by the Web Services Navigator

Service architect view
(Tivoli Web Services Navigator)



- Avoids need for debug tools on production boxes (Operations hates this)
- Provides the same collected data to each role in a format they understand and can work with
- No need for the architect/developer to recreate the problem to get into problem-solving

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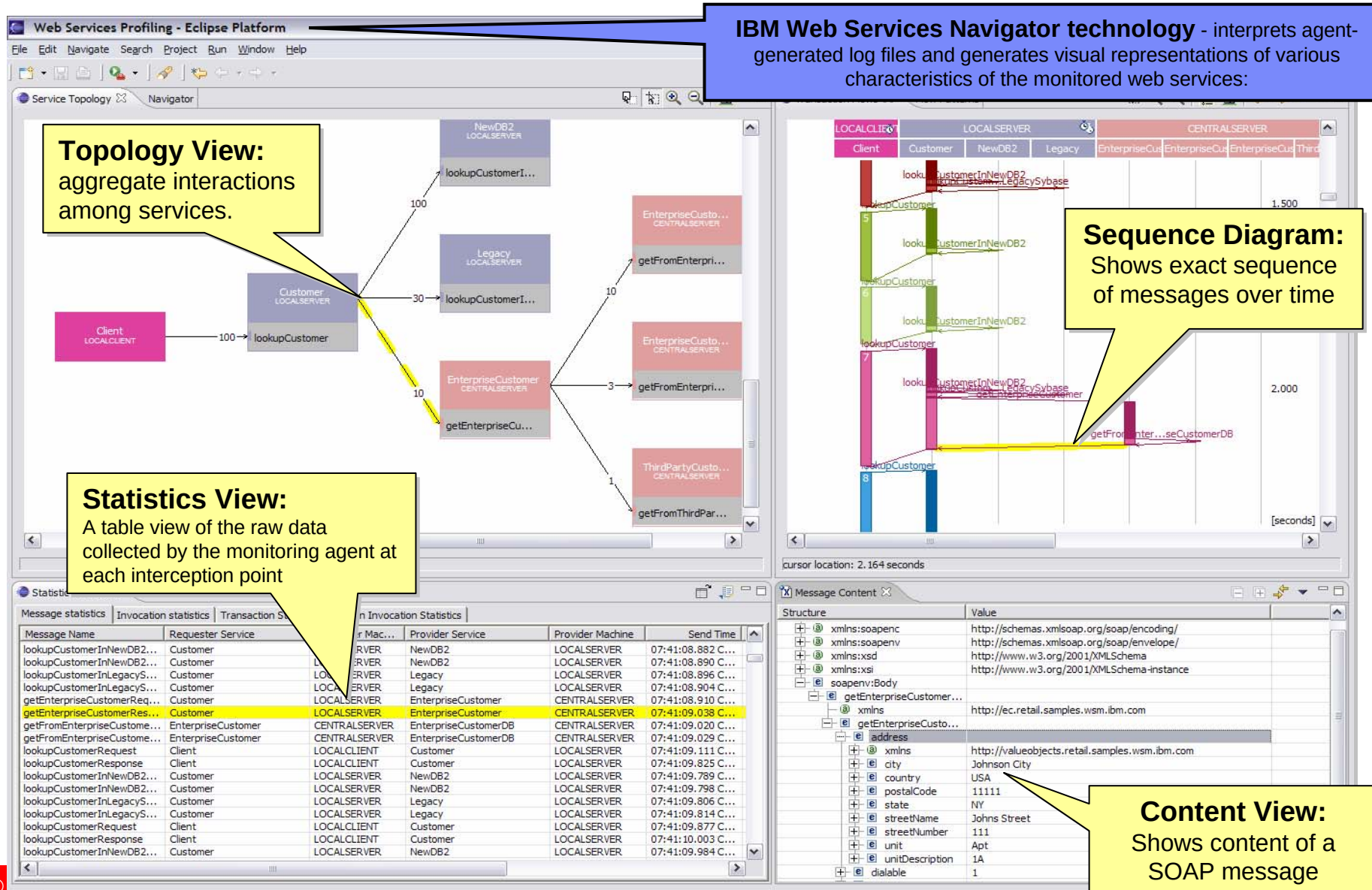
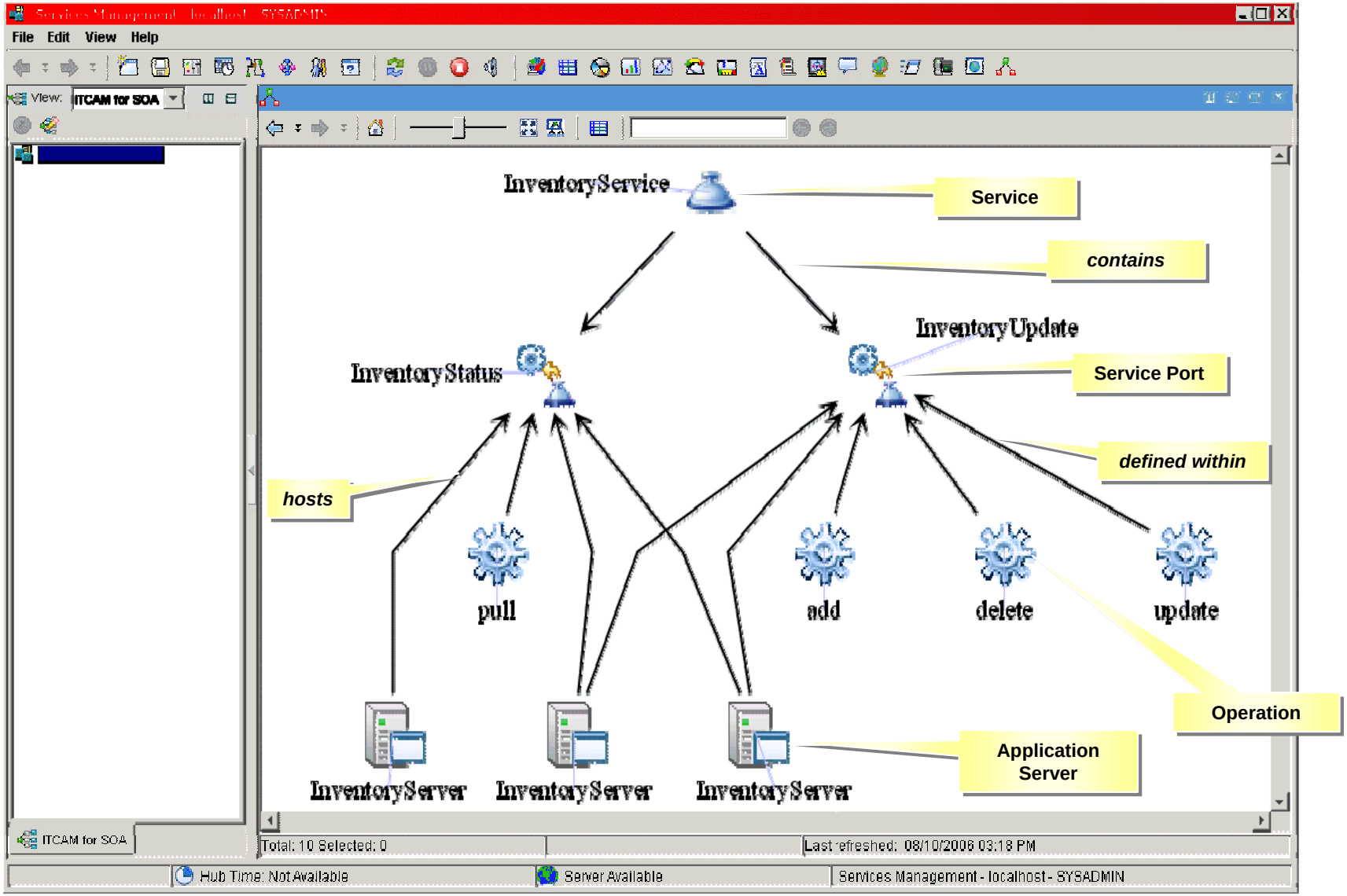
IBM Web Services Navigator

IBM Web Services Navigator technology - interprets agent-generated log files and generates visual representations of various characteristics of the monitored web services:



Service Details topology view



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ITCAM for WebSphere/J2EE

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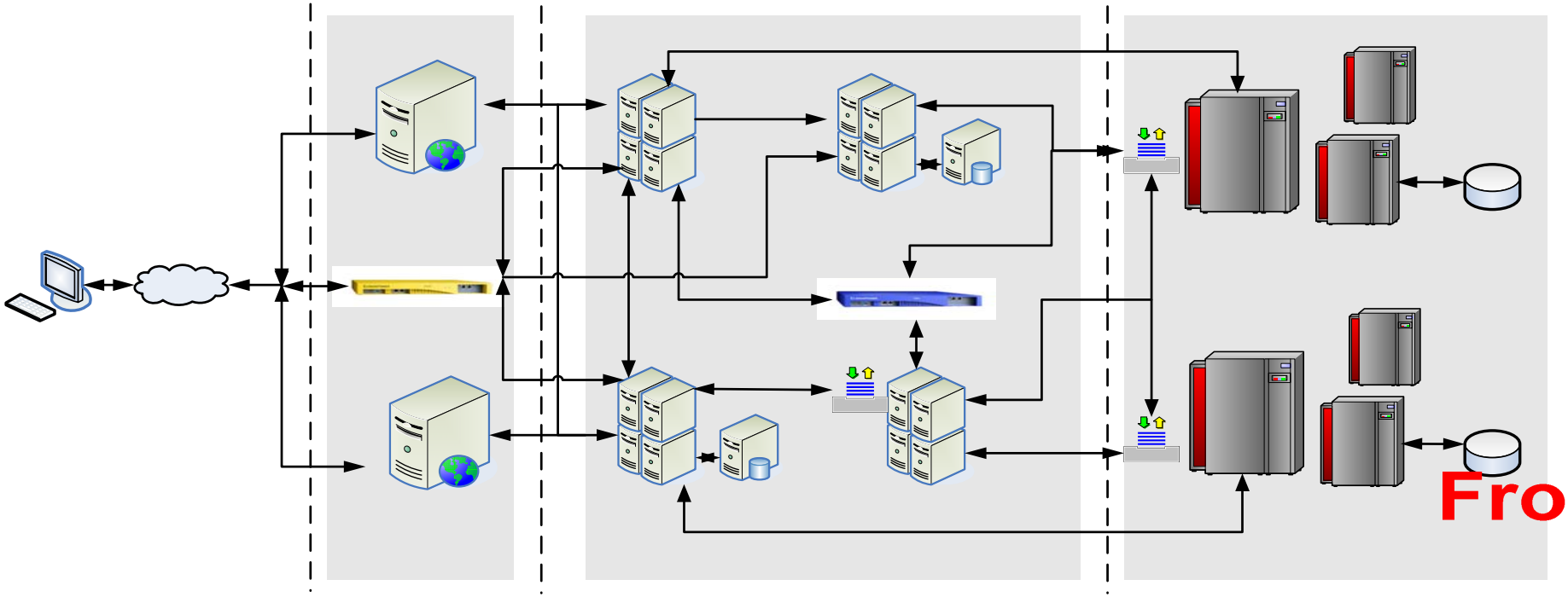
Typical WebSphere Application Landscape - Composite Applications



- Business processes increasingly depend on **multi-tier** composite applications
- It is challenging to design, build, test, and manage for high **performance** and **availability**
- SOA, while introducing architectural flexibility exposes more **inter-dependencies**
- Traditional development and management processes need to be expanded to account for challenges

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Common WebSphere Application Problems

- **Availability**
  - How can I take actions automatically if my server goes down?
  - How can I keep a history on availability for problem trend analysis?
  - How can I spot problem trends in real time and create alerts before they become critical situations?
- **Performance**
  - Application performance degrades over time and the crashes. How can I monitor the performance degradation and take pre-emptive actions?
  - Which component is the bottleneck?
- **Capacity and Resource Usage**
  - I want a centralized view of not just the application server resources but also of my system, network, storage etc.
- **Hung Application**
  - Is the problem in my application or due external systems or services that I depend on?
  - Lock contention – How do I know where exactly the problem without actually debugging the application problem in production environment?
- **Memory Leaks** - Do we leak memory in Java ?!!
- **Untested code** - How can I monitor uncaught exceptions and get alerts for problem conditions before it brings the application server down?
- **IT Operations and Development** - How can they get along together?
- **Fails in Production** - It worked in test/staging then why does it fail in production?

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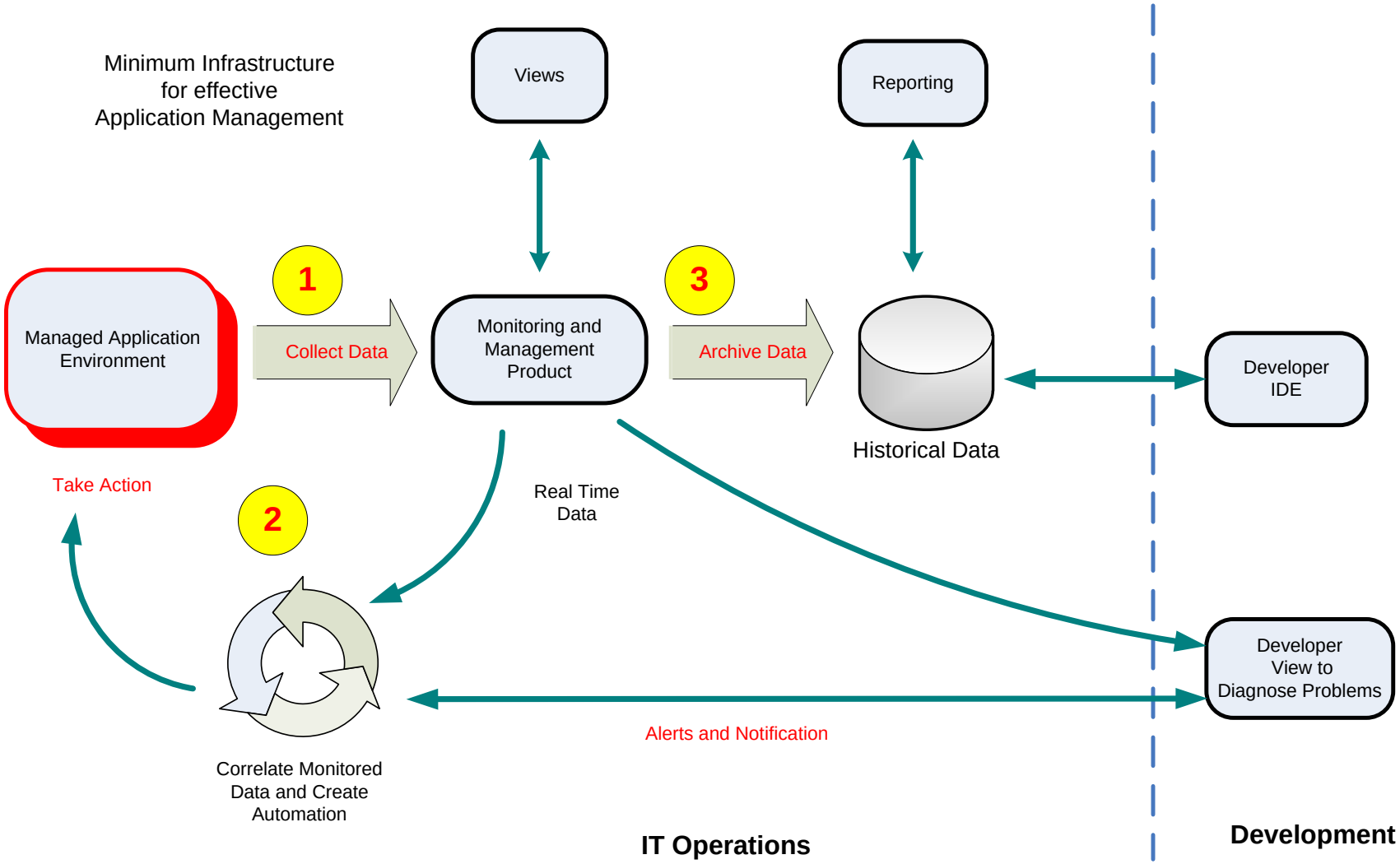
How can we solve these problems?



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What is ITCAM for WebSphere / J2EE?

- ITCAM for WebSphere/J2EE part of the ITCAM family of products for **application management infrastructure**
- Monitors applications running on WebSphere Application Server, WebSphere Process Server, WebSphere ESB, WebSphere Portal and other J2EE Servers **without requiring the applications to do any instrumentation**
- **Correlates** transactions from WAS/J2EE to CICS/IMS backend and other J2EE-J2EE containers
- Helps identify **performance bottlenecks** in development/test and production
- Helps isolate **production problems** through real time problem determination and also using collected production data via IPOT/Rational integration
- Provides **in depth** application analysis and management capability

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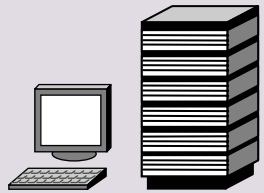
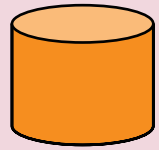
ITCAM for WebSphere/J2EE - Functionality Overview

Resource Availability (Interval Data)	Problem Determination (Real-time Data)	Performance Management (Historical)
		
■ **Systems Overview** - Enterprise - Group - Server ■ **Server Statistics Overview** ■ **Recent Activity** - 48 Hour Metric Comparison ■ **Systems Resources Overview** -Inspect all standard and custom MBeans ■ **Resource Comparison** - Group of Servers ■ **Comprehensive resource view in ITM/TEP**	■ **In-flight Request** ■ **Request Analysis** - Custom Edge Requests ■ **Software Consistency Check** ■ **Memory Diagnosis** - Integrates with MDD4J via ISA ■ **JVM Thread Display** ■ **Trap/Alert Management** ■ **Problem Center** ■ **Correlate requests** - across WAS, WS Portal, CICS, IMS	■ **Create Reports** ■ **View Saved Reports** ■ **Daily Statistics** ■ **Import Data via IPOT into Rational IDE debugging**

100% Instance Data Capture

Sampling Data

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Availability

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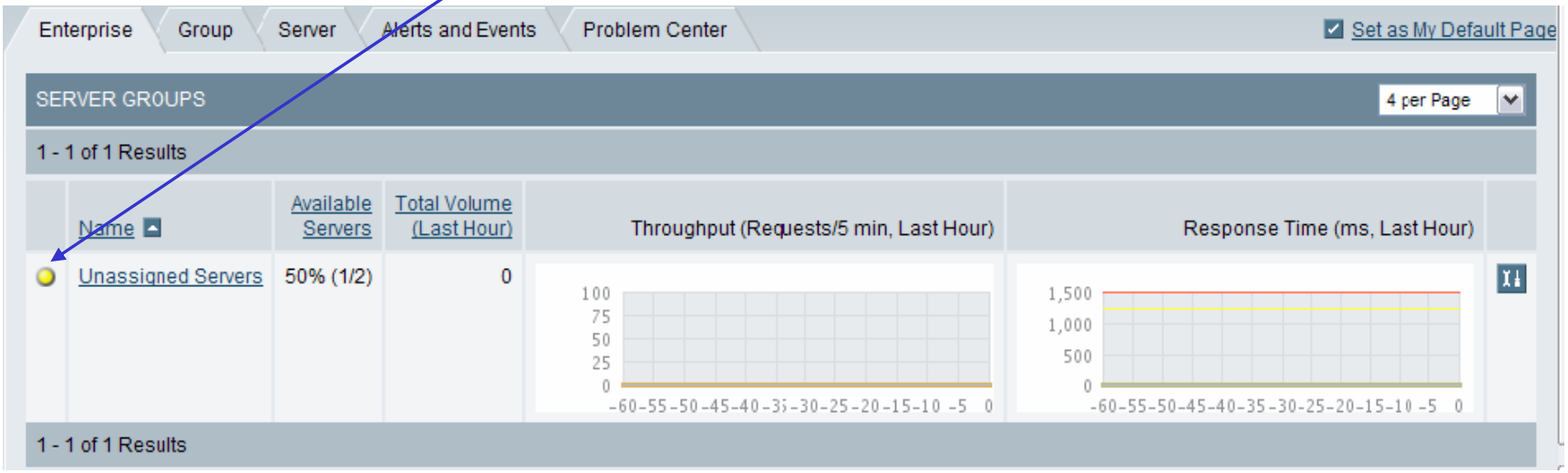
Availability Dashboards in ITCAM f WS/J2EE Web UI

- Provides Enterprise, Server Group, Server and Alerts/Events and Problem center overview
  - Helps monitor **enterprise's availability**, response time and throughput information by server group or individual servers
  - Server metrics like JVM, CPU, J2EE **resource** usage such as sessions, users etc.
  - Alerts and Events shows occurrence of predefined **situations**
  - **Isolate** problem servers and drill down more detailed information and diagnosis

View availability information about managed application servers



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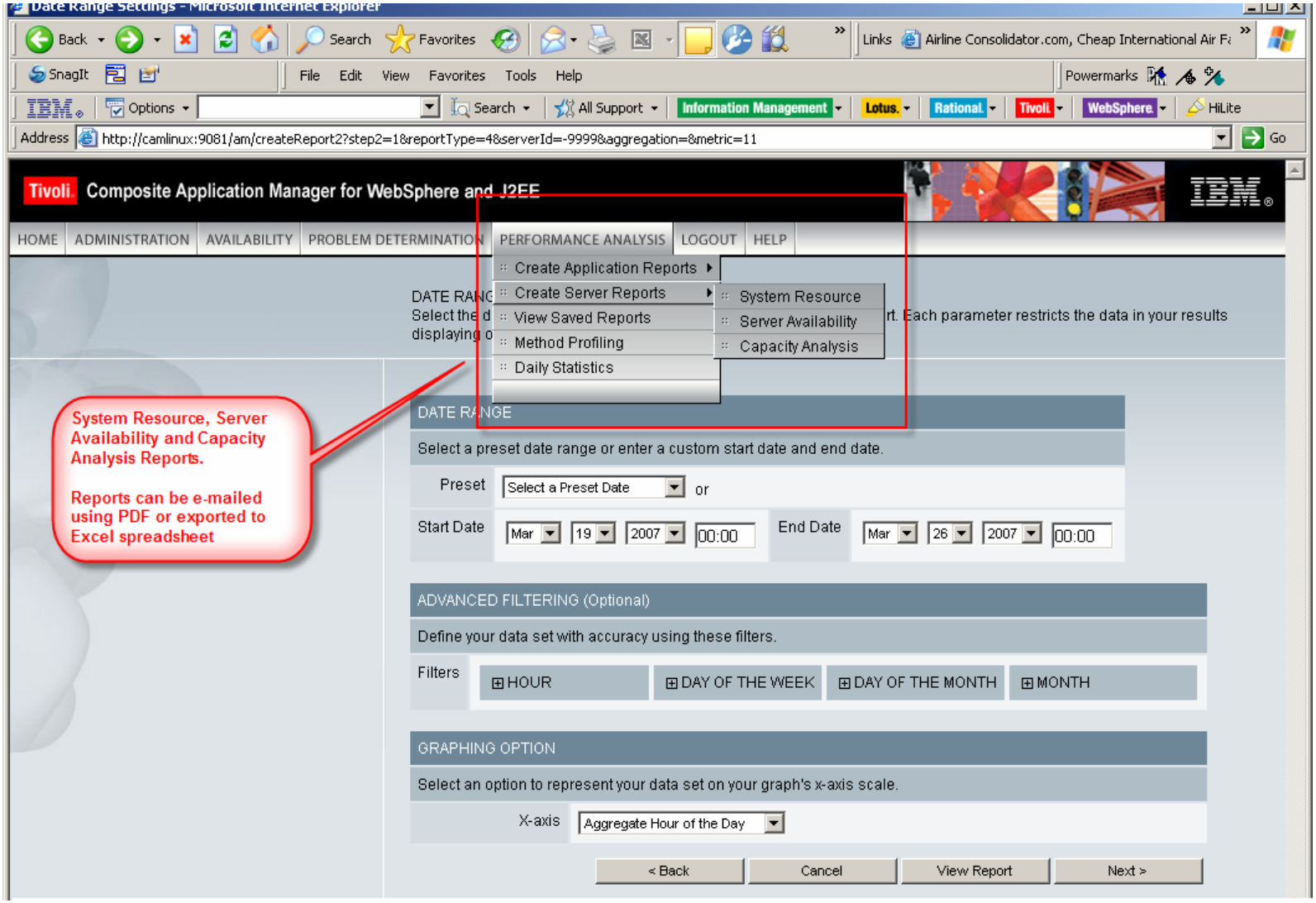
Availability Reports – ITCAM f WS/J2EE Web UI



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Performance

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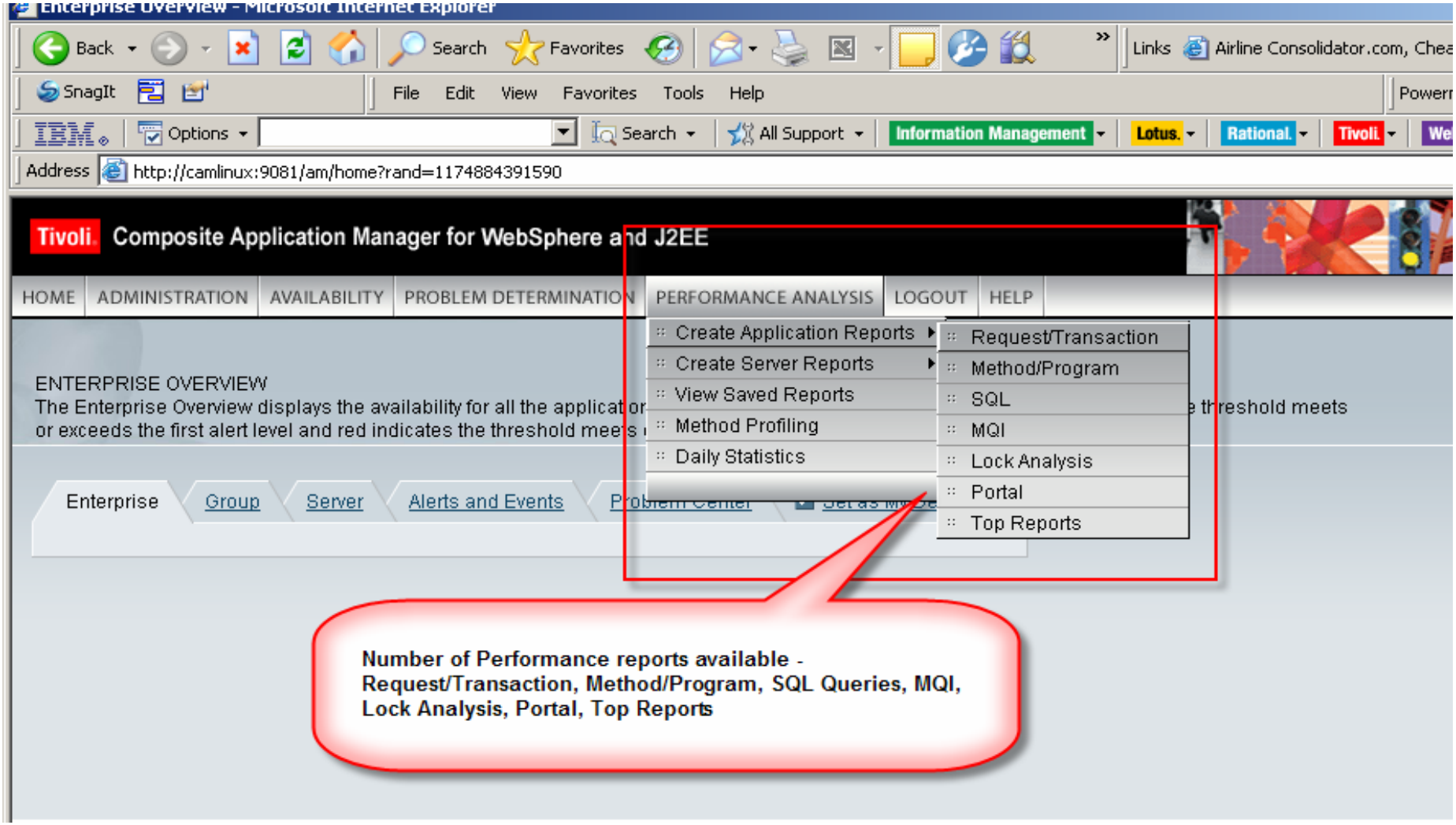
Performance Reports – ITCAM f WS/J2EE Web UI



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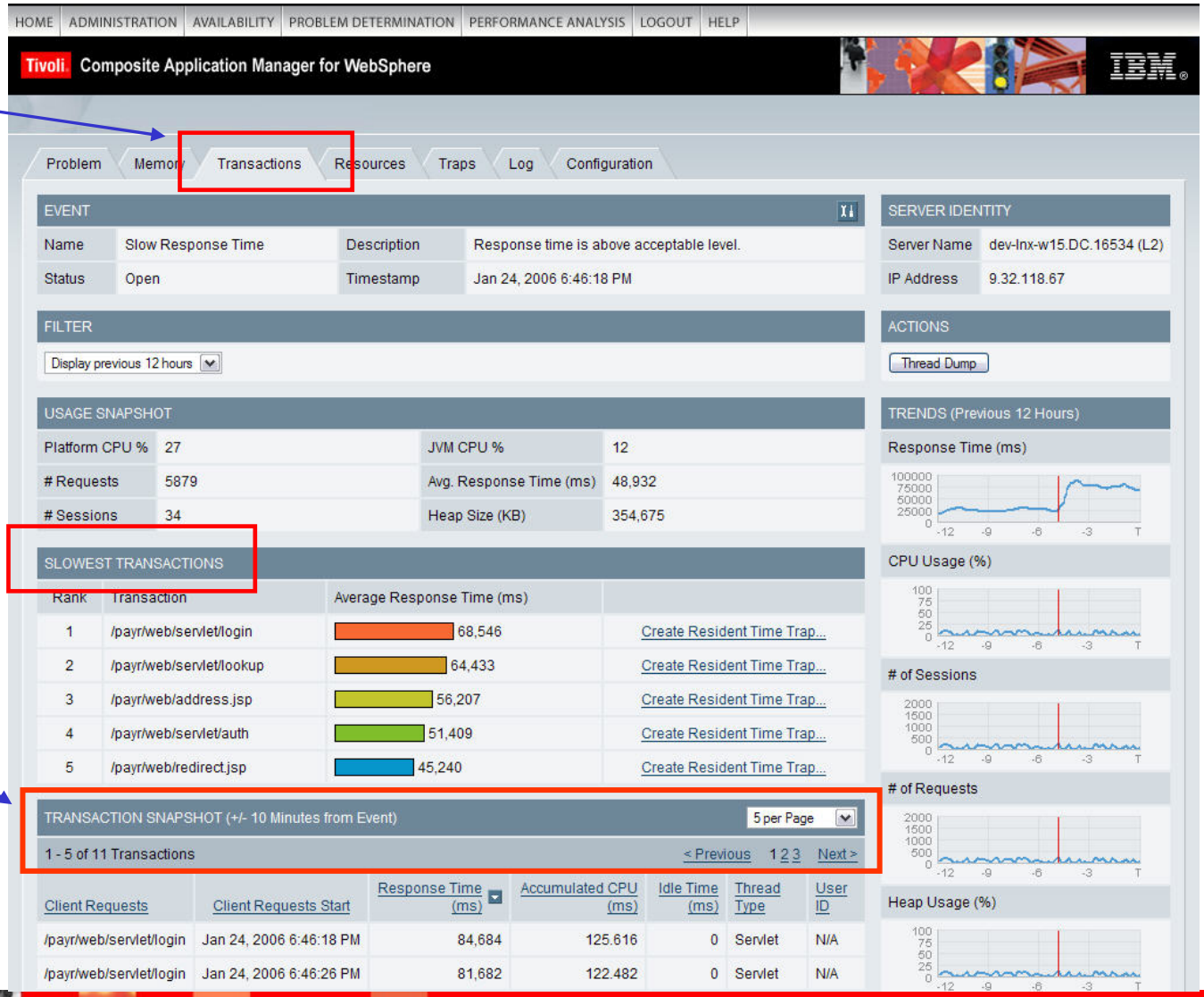
TOP Reports Reveals Bottleneck in Application Code

Rich Transaction monitoring and views

Isolate slow transaction for further diagnosis

Transaction snapshots to compare performance at different times



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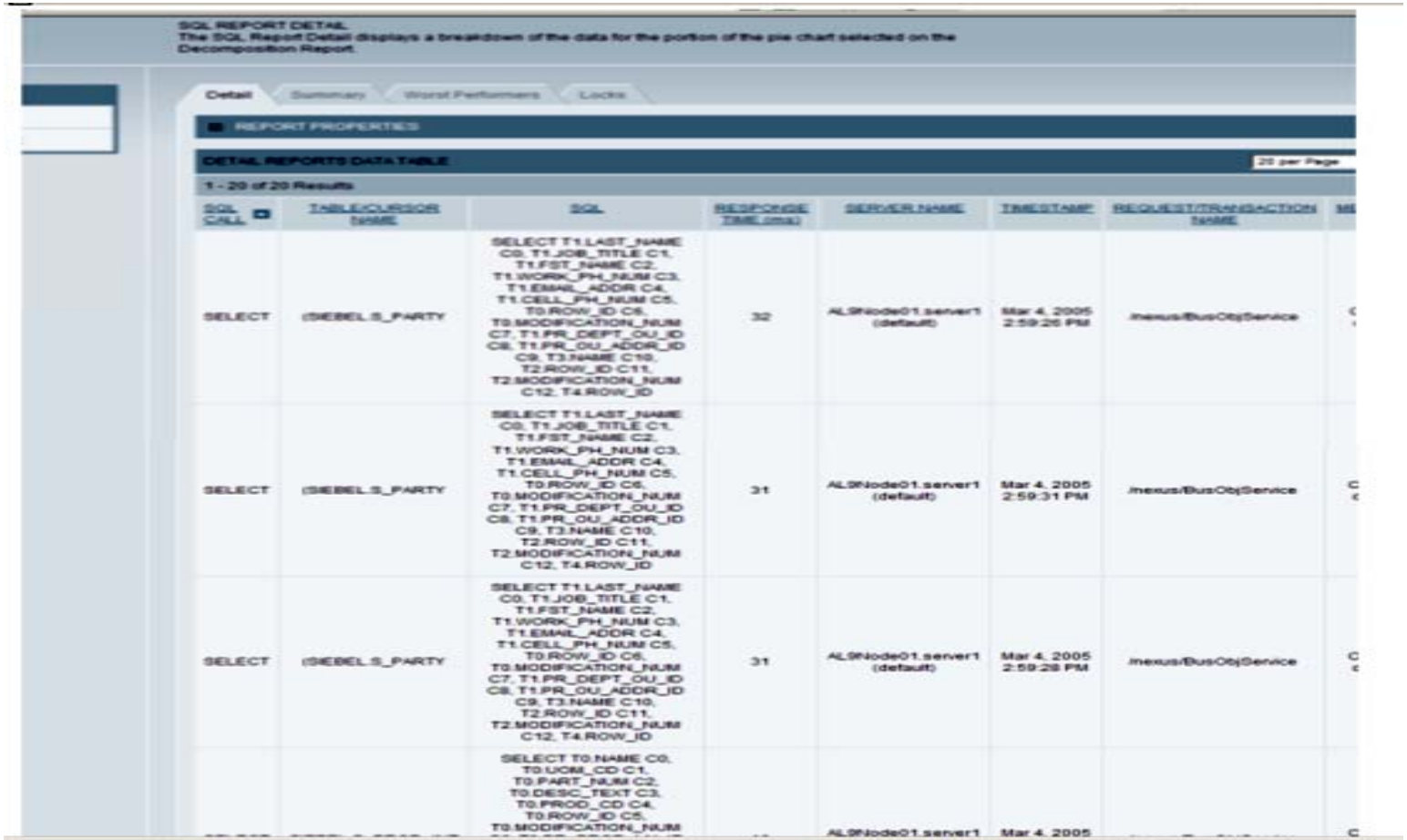
Example Reports - SQL - (ITCAM f WS/J2EE Web UI)

- Check the response time for various queries.
- Use the data in conjunction with Top used queries report. Tune queries.



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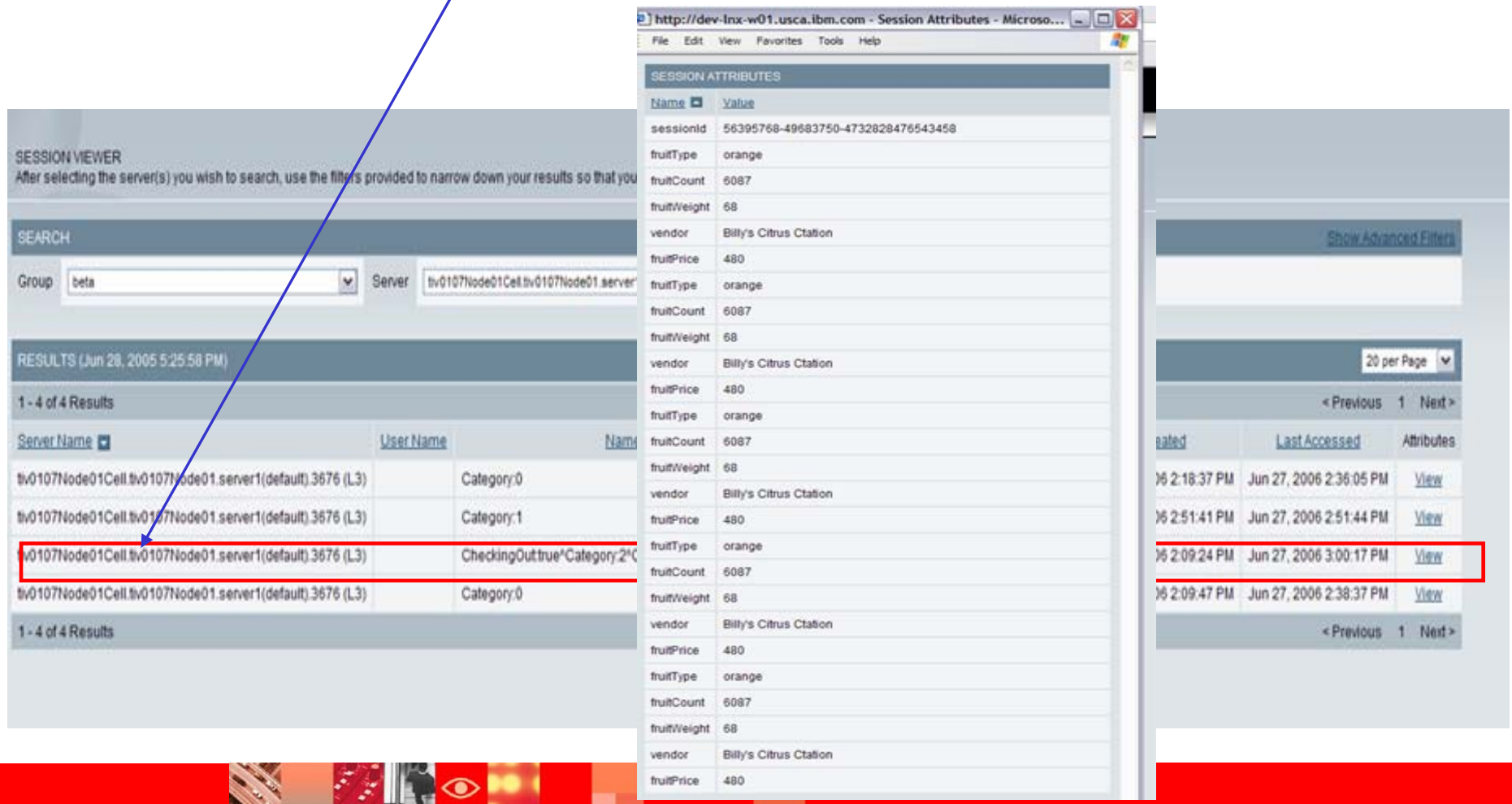
User Session Viewer - New in 6.1 (ITCAM f WS/J2EE Web UI)

Search session objects based on a certain criteria e.g. size and view detailed session attributes. **A very useful tool for debugging memory and performance problems**



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Capacity and Resource Usage

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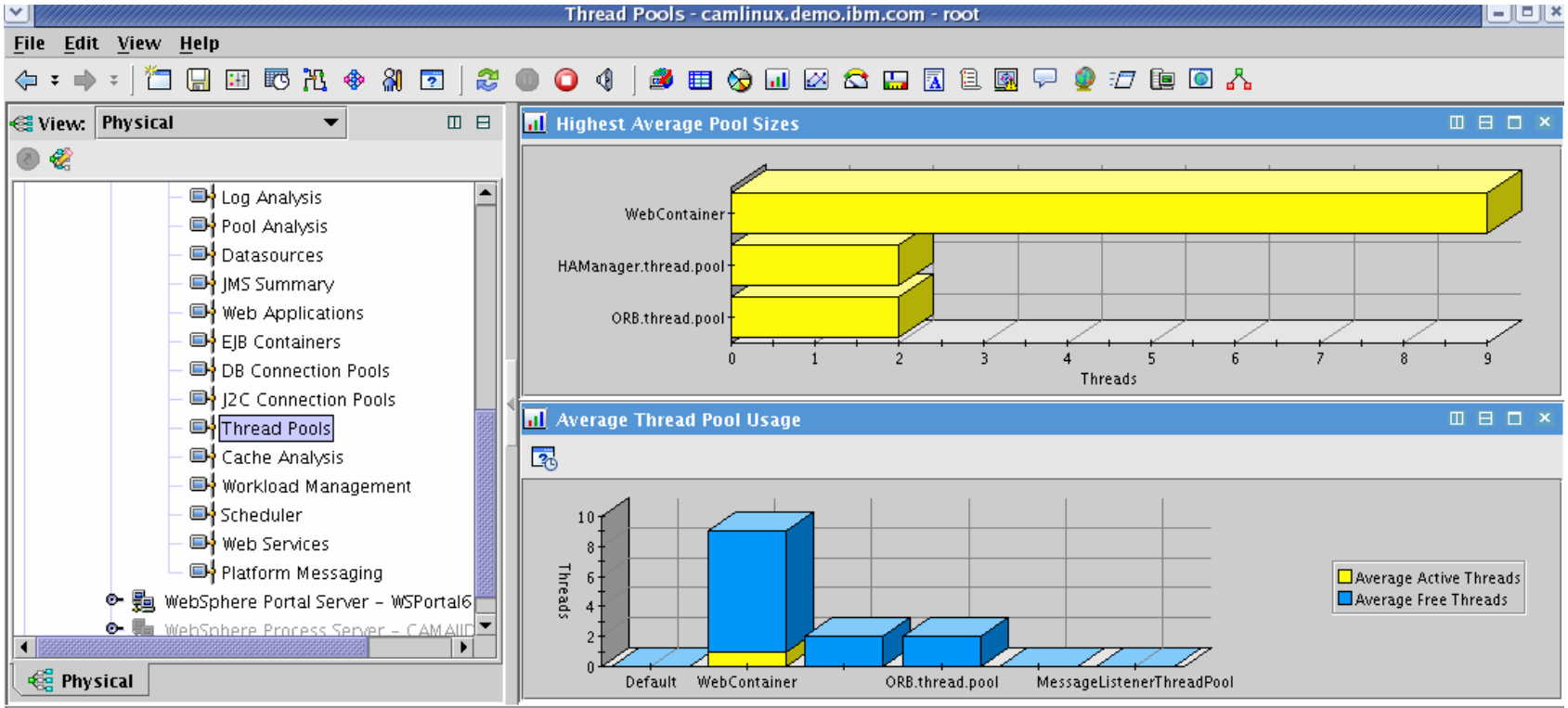
Sample Screen Shot – Thread Pools



Thread Pools

Thread Pool Name	Sample Date and Time	Interval (sec)	Maximum Pool Size	Average Pool Size	Average Active Threads	Average Free Threads	Percent of Time Pool at Max	Threads Created	Thread Creation Rate (per sec)	Threads Destroyed	Thread De Rate (pe
Default	03/25/07 22:18:42	75	20	0.000	0.000	0.000					
WebContainer	03/25/07 22:18:42	75	50	9.000	1.000	8.000					
HAManager.thread.pool	03/25/07 22:18:42	75	2	2.000	0.000	2.000					
ORB.thread.pool	03/25/07 22:18:42	75	50	2.000	0.000	2.000					
SIBFAPInboundThreadPool	03/25/07 22:18:42	75	50	0.000	0.000	0.000					
MessageListenerThreadPool	03/25/07 22:18:42	75	50	0.000	0.000	0.000					
[Summary]	03/25/07 22:18:42	75	222	13.000	1.000	12.000					

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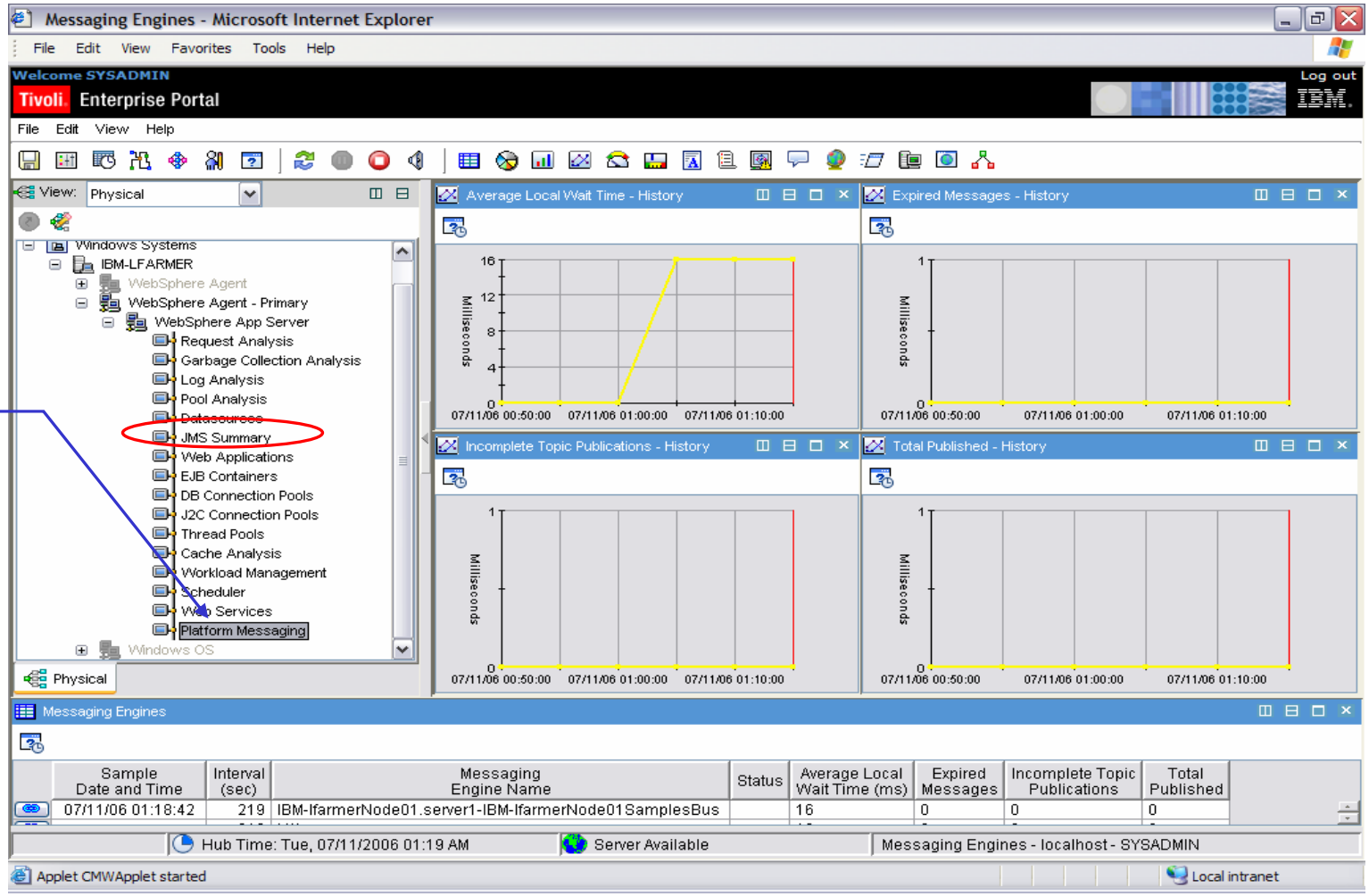
New Workspaces – JMS Summary, Platform Messaging - New in 6.1 (WS Only)

New workspace Platform Messaging provides Destination – Queues/Topics, Messaging Engine, WMQ Client Link metrics



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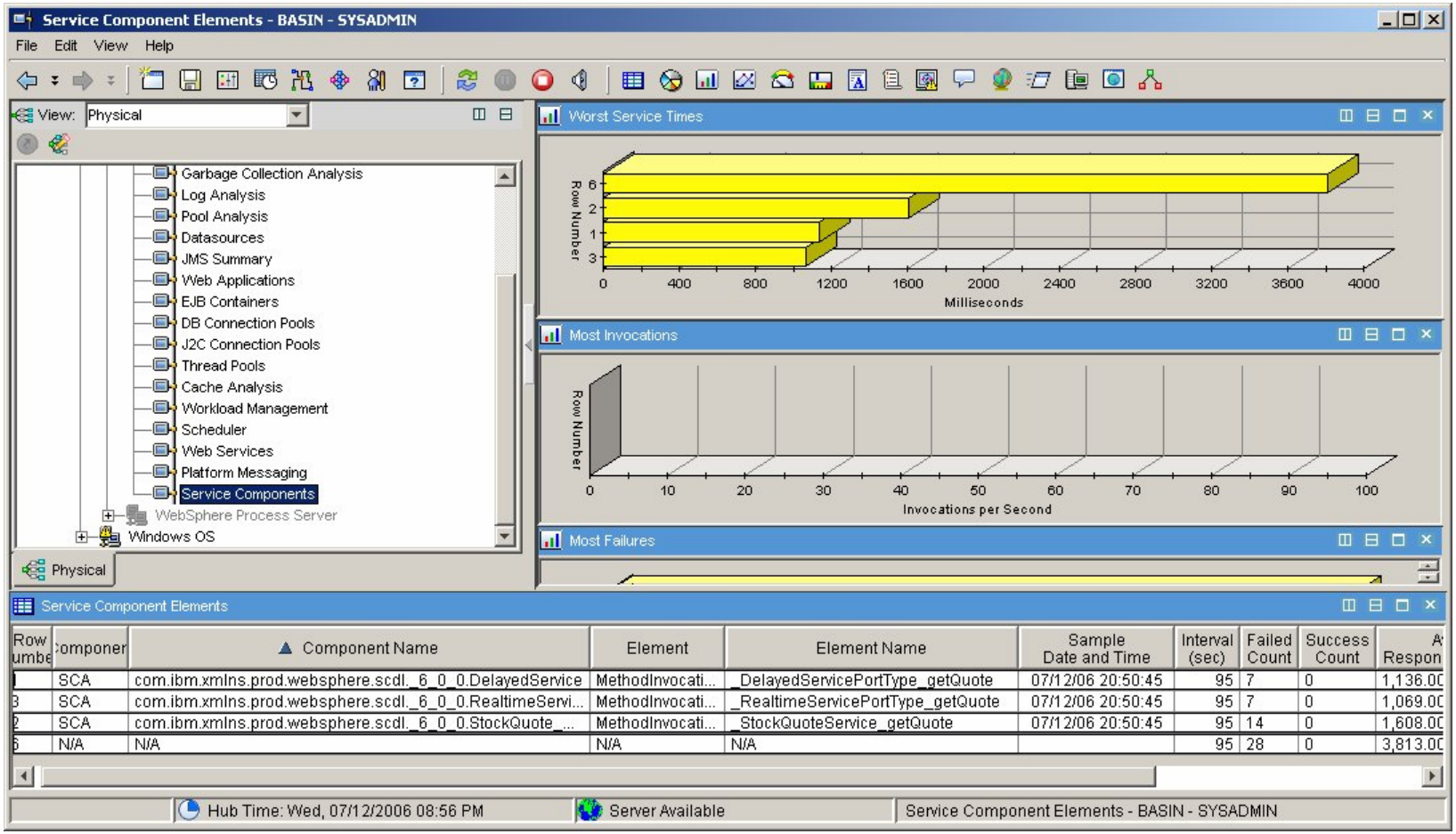
Sample Screen Shot – WPS / WESB Service Components (WS only)



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Hung Application

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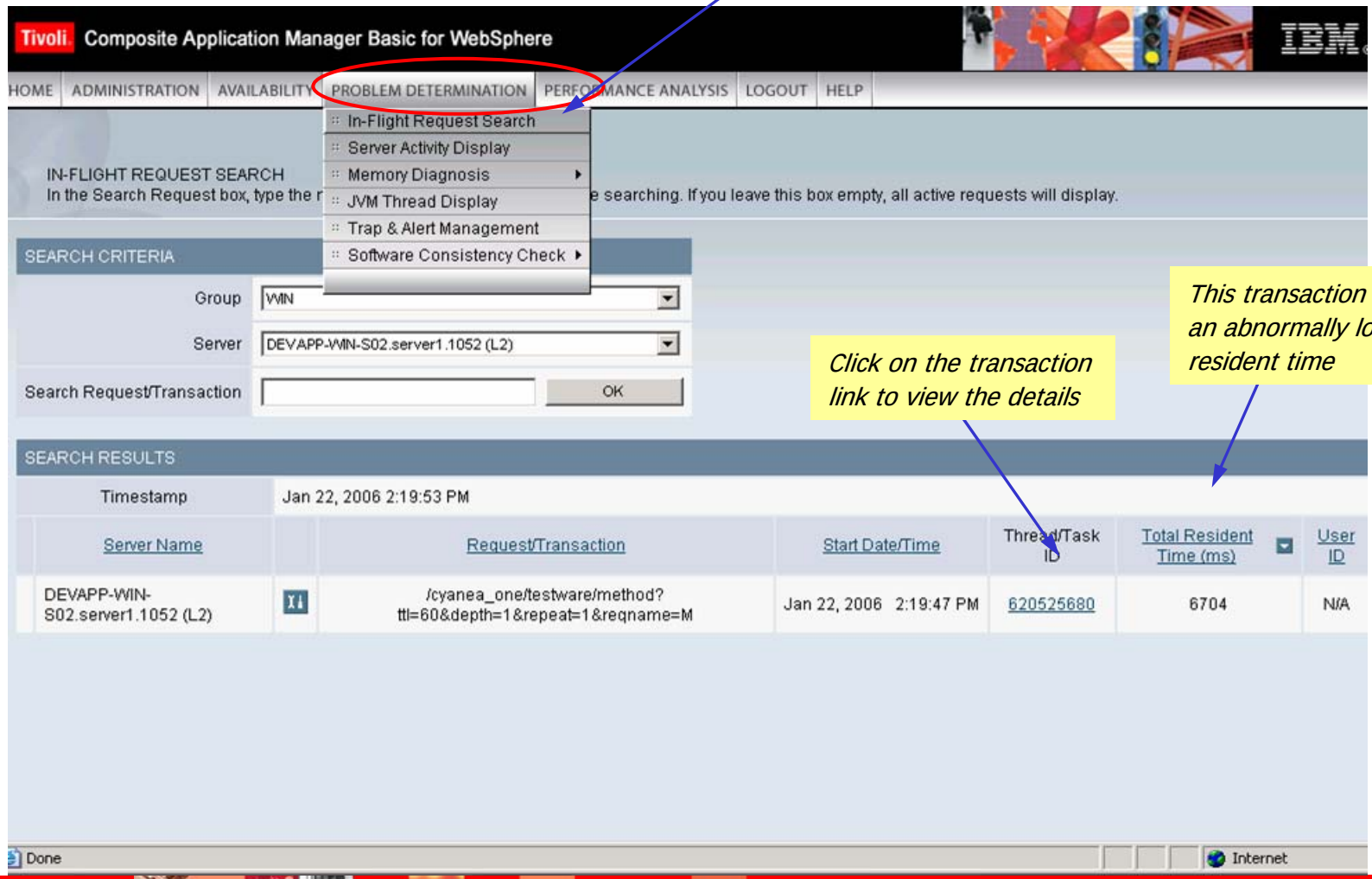
In Flight Request Search – Real Time Diagnosis

"In-flight Request Search" reveals the transactions that are still "hanging" and have not finished execution)



Click on the transaction link to view the details

This transaction shows an abnormally long resident time

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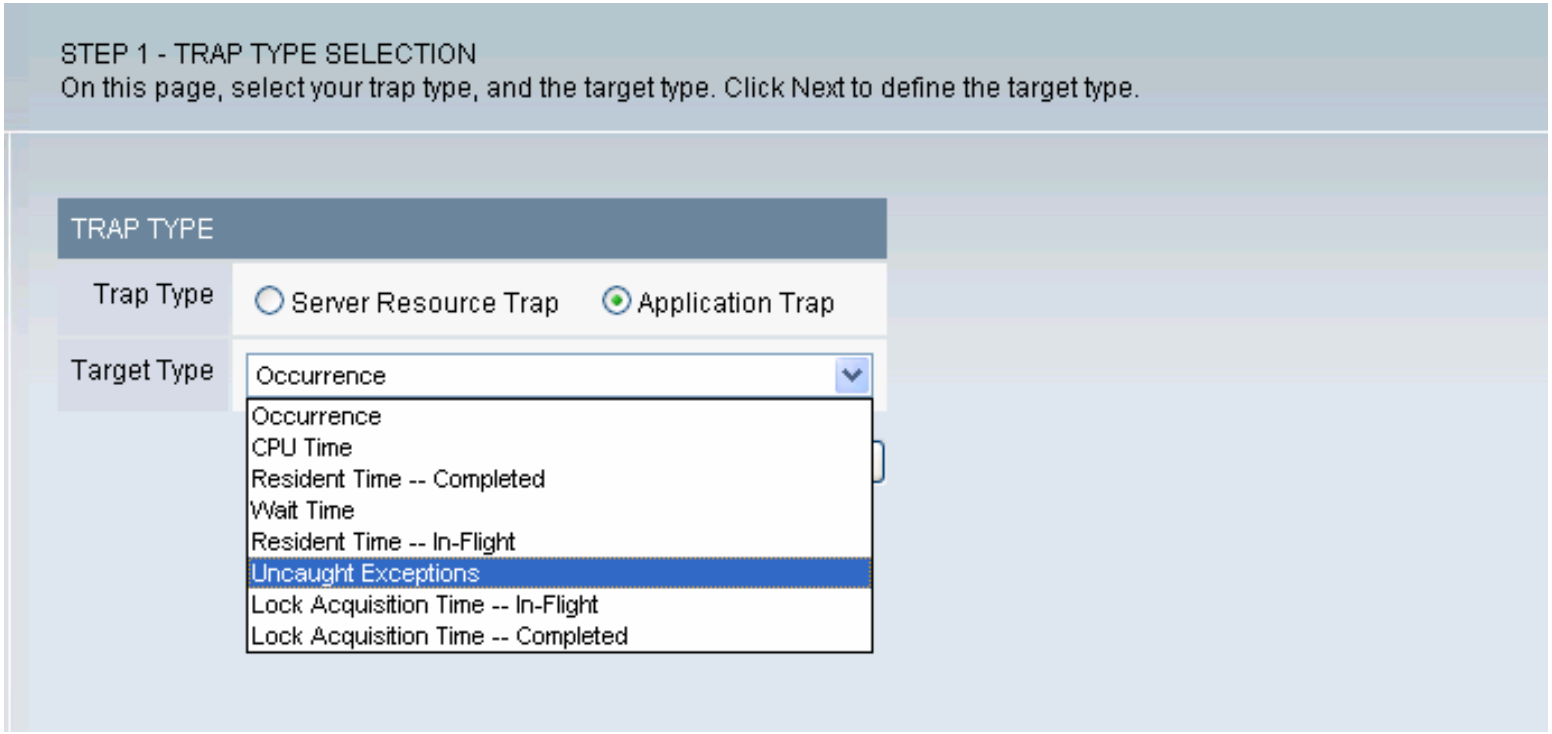
Automation - Application Traps

Create an application trap based on occurrence, cpu time, wait time, uncaught exceptions etc. and get notified or monitor trap history.



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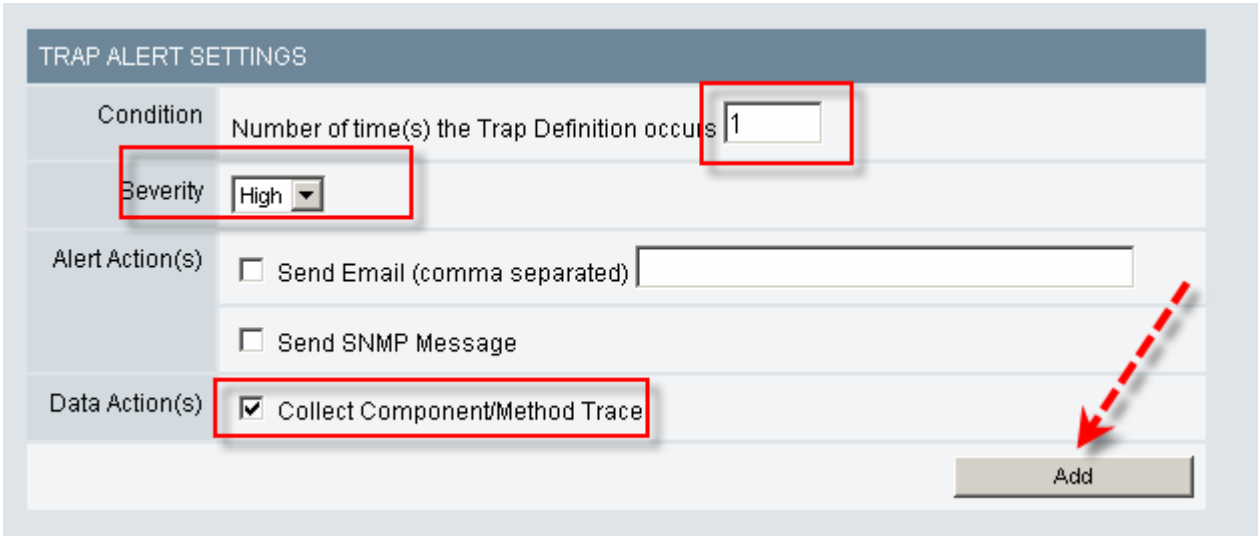
Trap Actions



- Send an SNMP Message or e-mail alert
- Collect Component / Method trace
- If the trap is in-flight you can also take a stack trace

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Java Memory Problems

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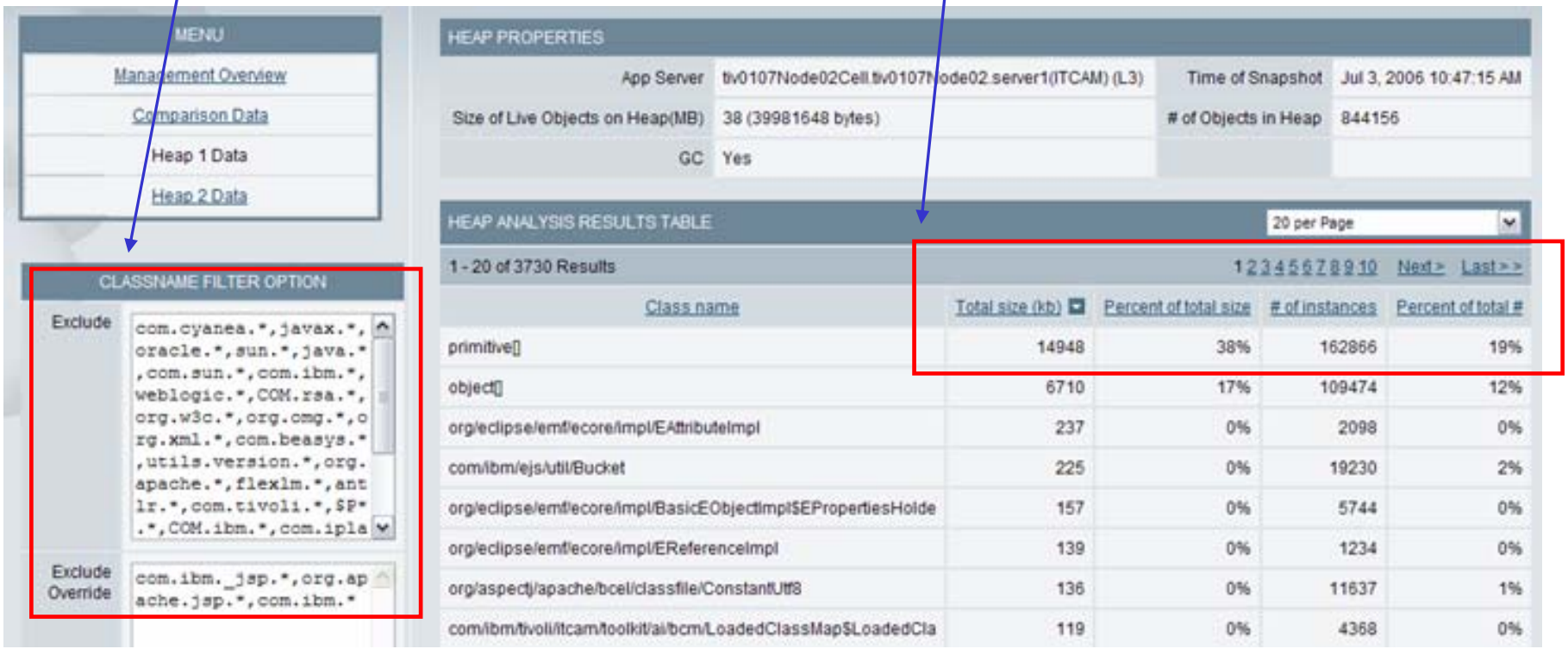
Memory Analysis – Fix Memory leaks

Limit classes to your application using exclude filter

Compare JVM heap data for finding objects instances that has grown over a time period



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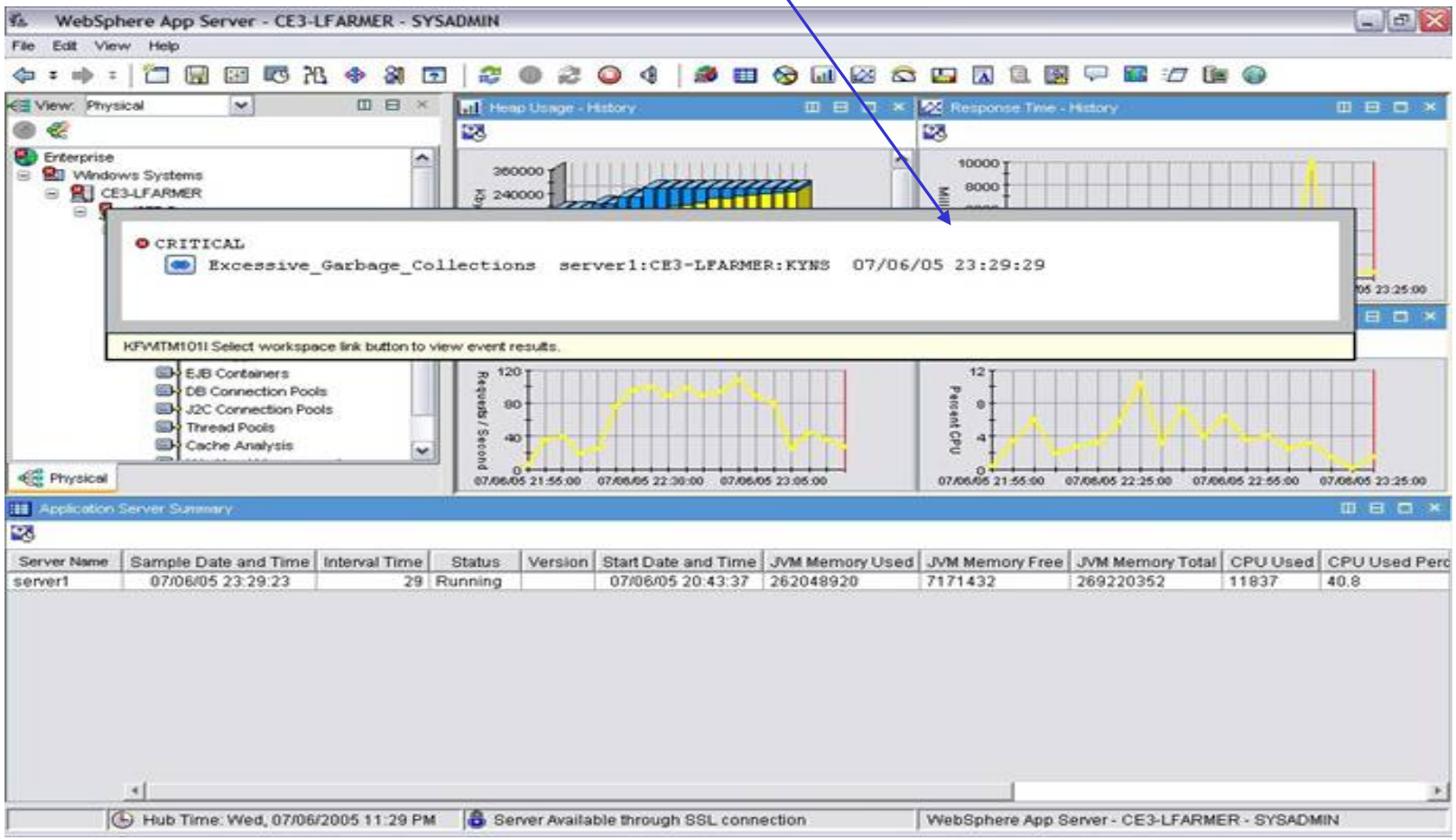
TEP Situations – Excessive_Garbage_Collection

Use predefined ITCAM for WS/J2EE TEP **situations** or create **custom situation** using predefined attributes e.g. a custom situation to indicate excessive garbage collection can trigger a visual indication and automated actions can be taken as a result.



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It works in Test/Staging!

Why does it fail in Production?

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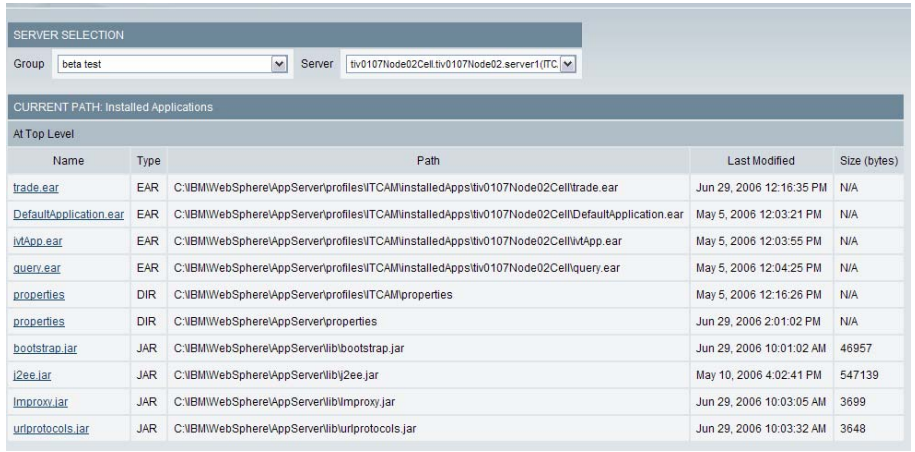
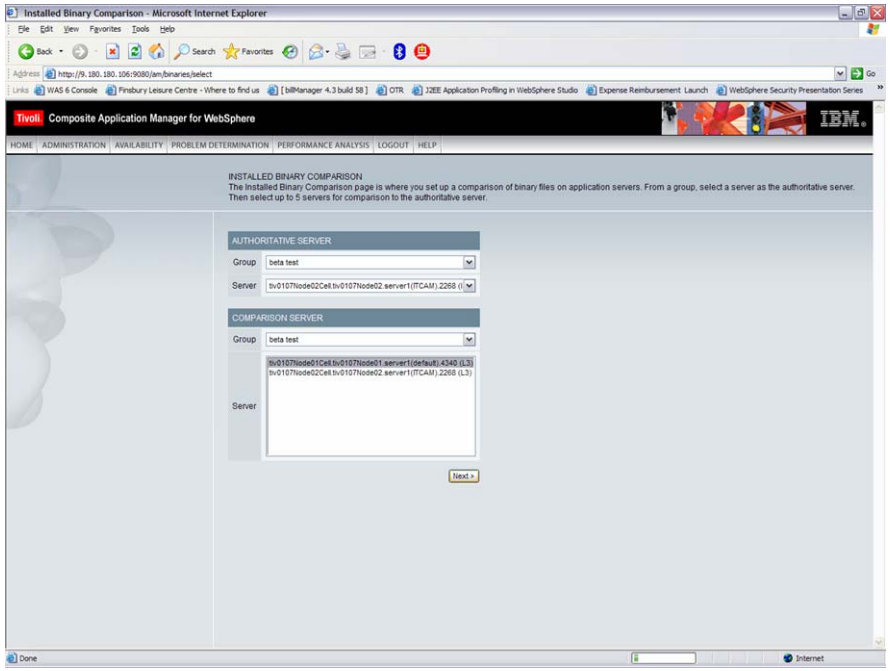
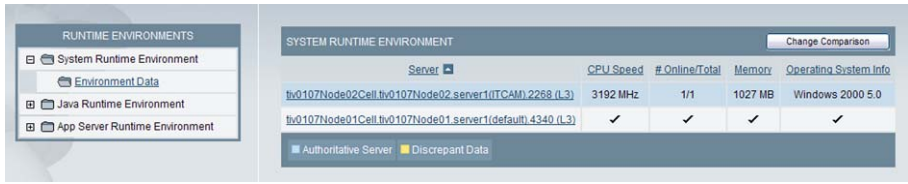
Software Consistency Check (WS/J2EE)

- Find all the binaries (EARs) deployed to a specified server
- Compare the binaries with an authoritative server
- You can also compare various runtime
- environment settings for two servers







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Bridging IT Operations and Development

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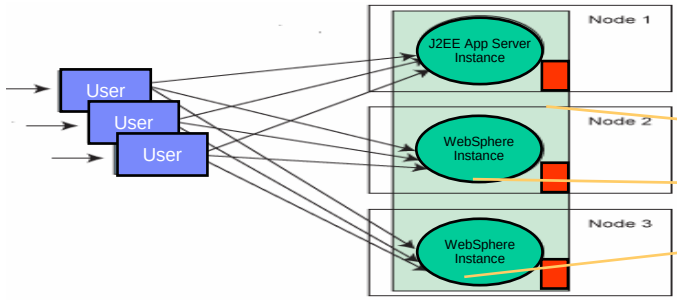
Use production data to debug hard to recreate problems using IPOT *Bridging IT operations and development*.

1 Users exercise load on production J2EE application

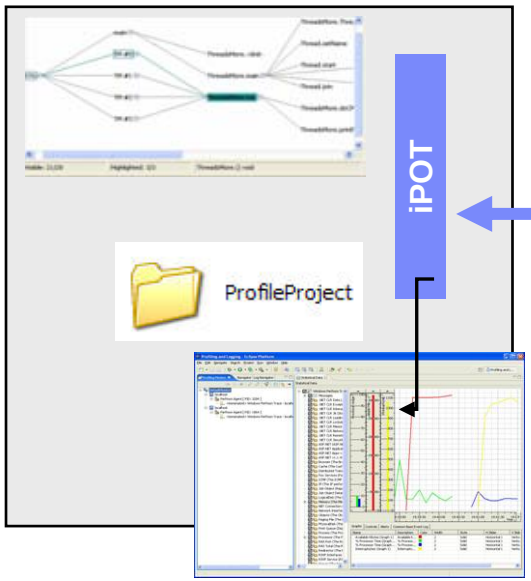


IT

2 CAM for WS captures resource and instance-level transaction metrics

= J2EE Data Collection Agent (PMI, JVMPI, BCI)

IT CAM Web Services API



4 Application Trace data imported directly into Developer RPT desktop via Performance Optimization Toolkit (iPOT)

3 CAM's Web Services API exposes live transaction data for import into RPT desktop

Rational Performance Tester

WebSphere Application (Production Environment)

IT CAM for WS/J2EE/RTT

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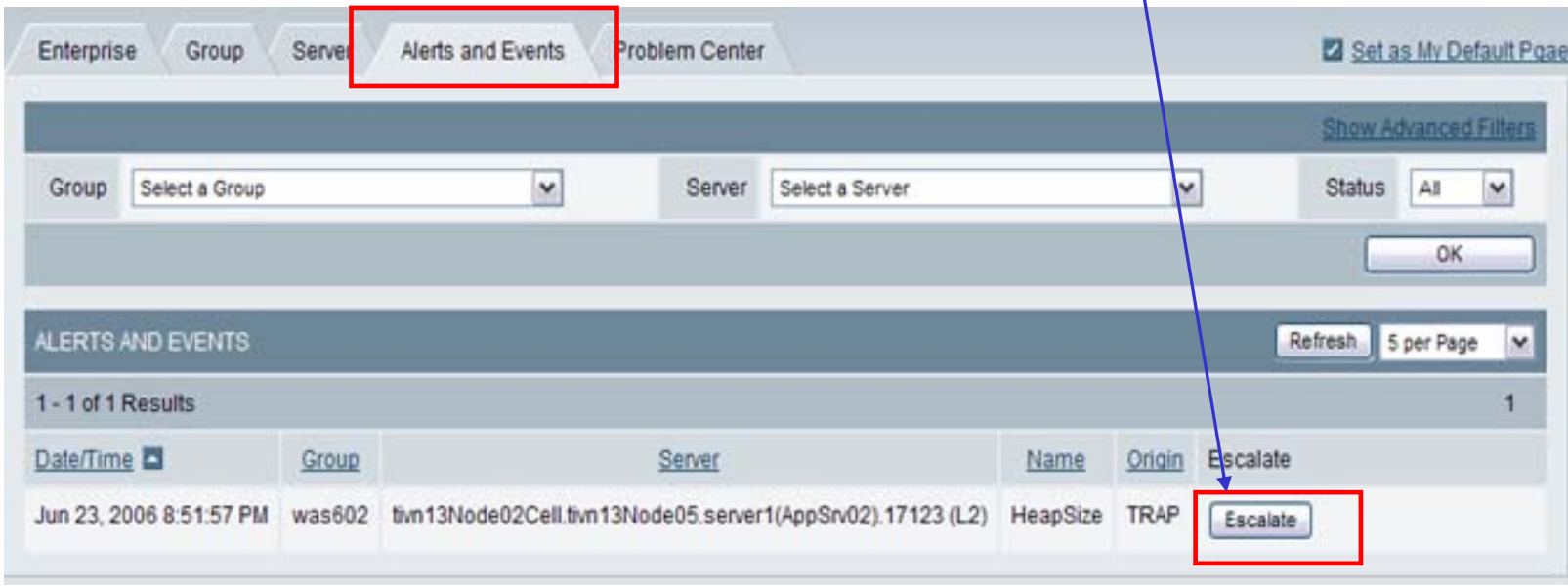
Automation – Collect problem context with application Traps

Setup up software trap when certain condition is satisfied e.g. when JVM heap size grows beyond a certain size send an event notification via e-mail/SNMP and/or get diagnostic data such as thread dump or stack trace or heap dump (new).

Receive TEP events and Escalate the alert and events to Problem center complete with full problem context for further diagnosis



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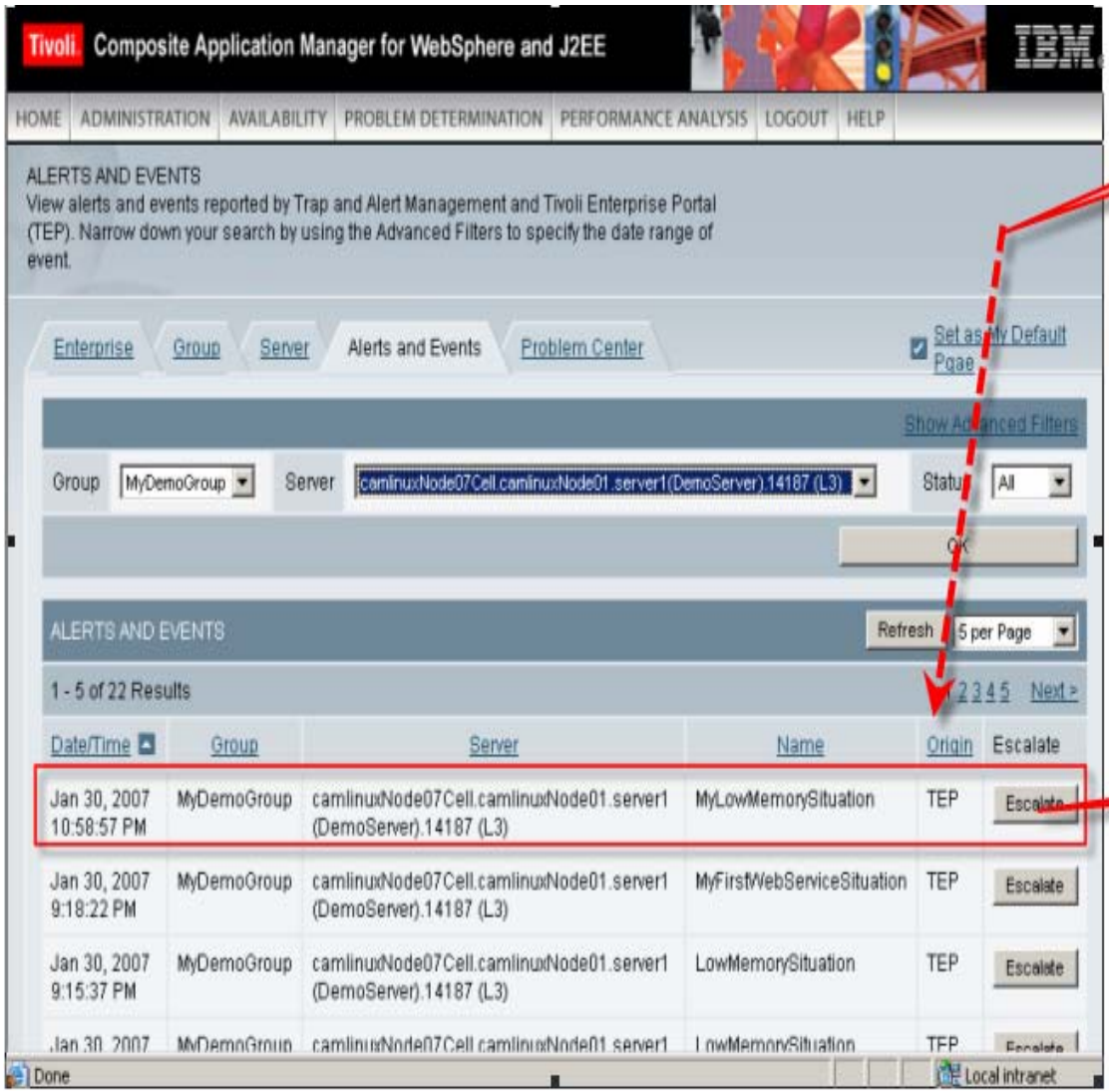
Receive ITM/TEP events in ITCAM f WS Problem Center



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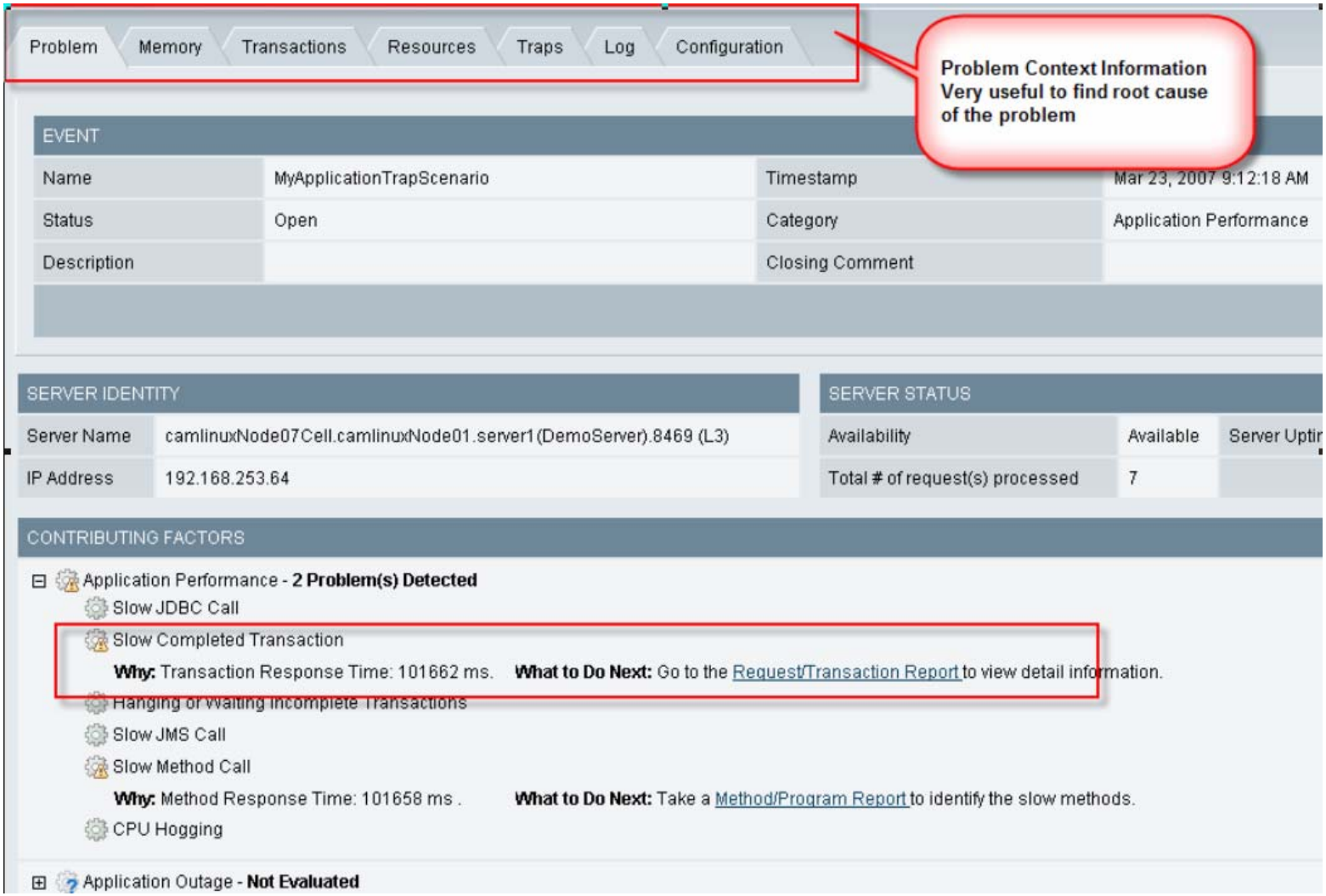
Problem Center – Problem Context captured from Traps and TEP Events



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Automation

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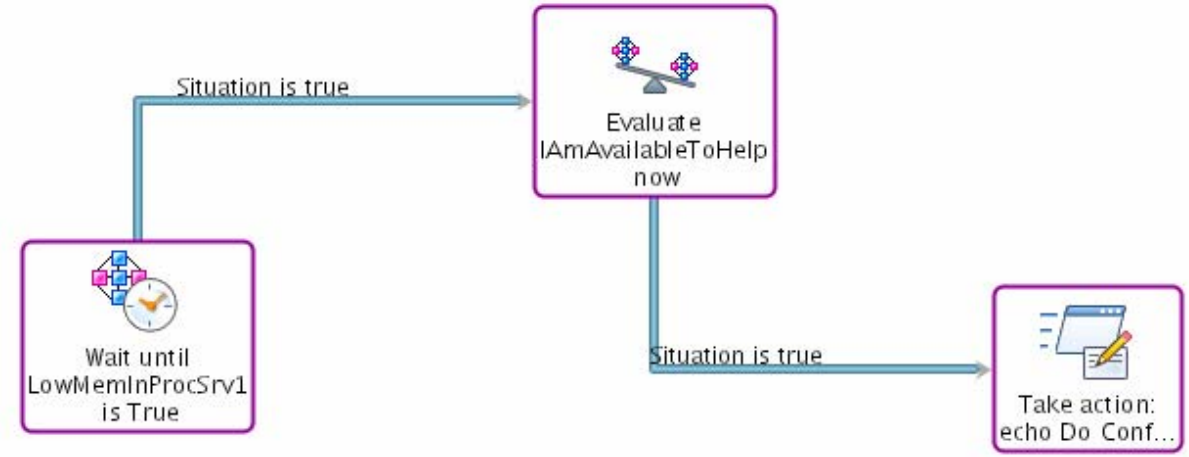
What is Automation?

- Automatic monitoring of a **situation** or **problem condition** (think rules !) using monitored resources or attributes
- When that **situation** or **problem condition** becomes true a **Take an Action command is executed**
  - Pre-defined and Custom Situations
  - Pre-defined and Custom Take Actions
- Custom automation combining existing pre-defined or custom situations and Take Actions



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Automation In ITM / TEP – Access to all managed agents

- **Situation Editor -** You can use the rich easy to use situation editor to create custom or pre-defined situations at various levels – enterprise, system/node, monitored agent node etc.
  - Some Examples of predefined situations
    - ITCAM for WS/J2EE – **WASHighResponseTime** - monitors the average request response time and issues a Critical condition whenever that time exceeds two seconds.
    - ITCAM for SOA – **MaxMessageSize_610 –** Triggered when the max message size exceeds a certain value. Default value 1600 bytes
- When that **situation** or **problem condition** becomes true then execute **Take an Action**
  - Again you can use pre-defined Take Actions or create your custom take action commands
  - Some Examples of pre-defined Take Action
    - ITCAM for WS/J2EE - **Recycle_WAS_Server** - recycles a WAS server
    - ITCAM for SOA – **ConfigureMediation_610 -** configures a managed mediation primitive

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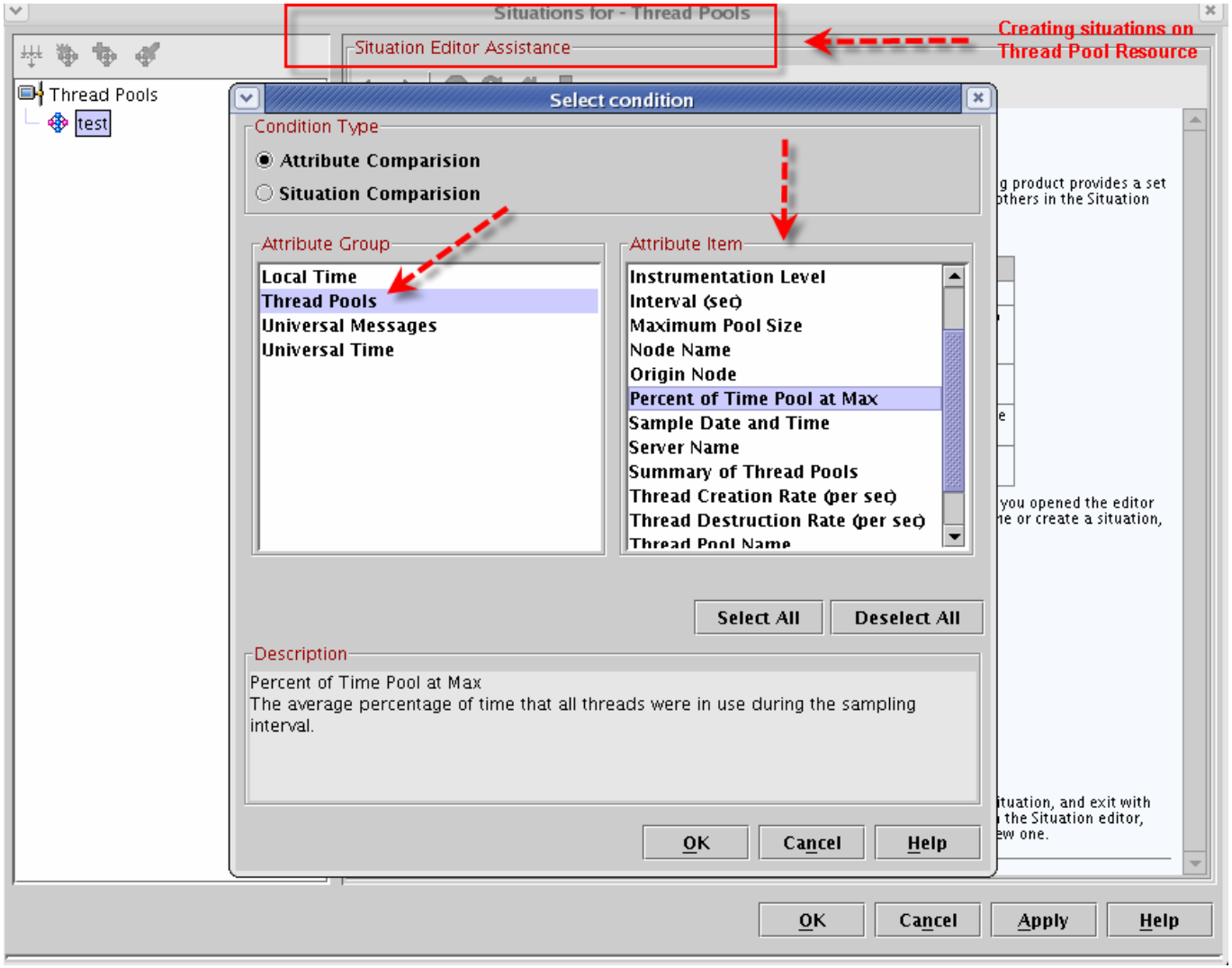
Example - Creating Situations on resource data



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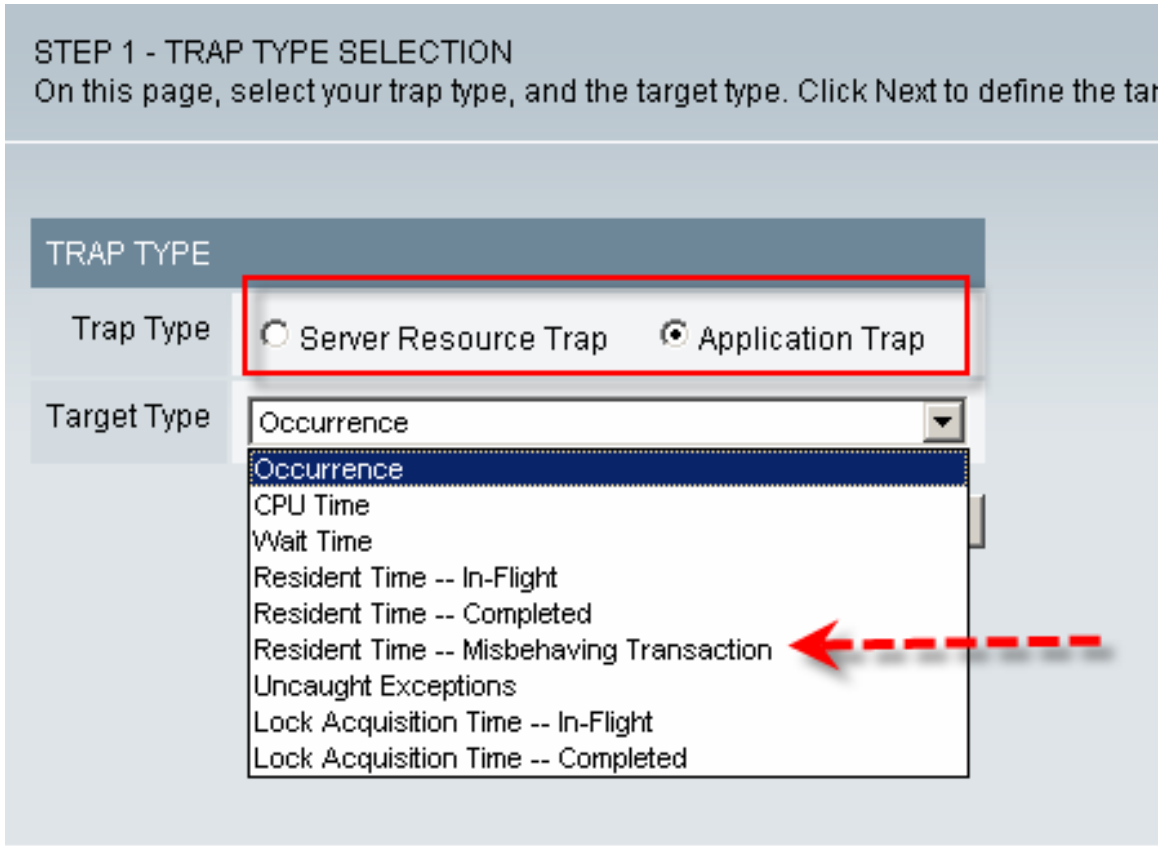
Automation in ITCAM for WS/J2EE – More Fine grained

Problem monitoring Automation capability from ITCAM f WS console – Create an application trap based on occurrence, cpu time, wait time, uncaught exceptions etc. and get notified or monitor trap history.



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IBM Tivoli Monitoring Overview

Rick Huang
Senior I/T Specialist
IBM Software Group

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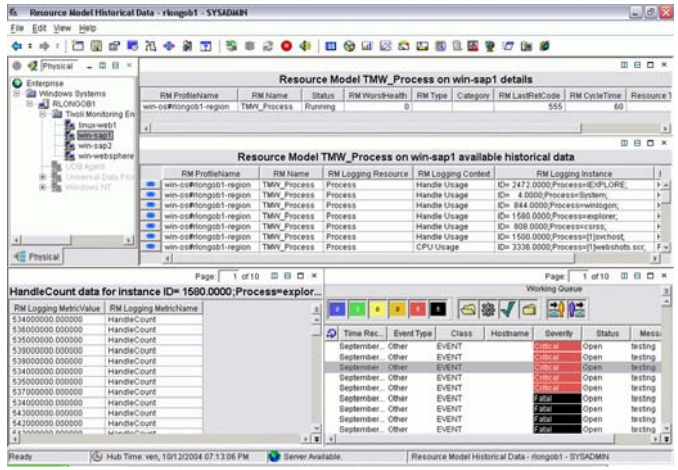
Tivoli Monitoring Capabilities with ITM 6.1

- Single portal presenting combined end-to-end resource monitoring DM, ITM5,OMEGAMON (zSeries and Distributed) and ITM 6.
- Significant monitoring enhancements delivered throughout 2005
- Delivered through the Tivoli Enterprise Portal
- A mix of ITM 5 and ITM 6 interoperating monitors



Platforms	Databases	Web Infrastructure	Business Integration	Applications	Messaging & Collaboration	Virtual Servers & Clustering
UNIX	DB2	WebSphere Application Server	IMS	SAP	Exchange	Citrix
Windows	Oracle	WebLogic	CICS	.NET		VMware
Linux	MS SQL	Tomcat	WebSphere MQ	Siebel	Lotus Domino	MS Virtual Servers
z/OS	Sybase	JBoss				MS Clustering
OS/400	Informix	Oracle AP Server				HACMP Clustering
Netware						
Active Directory						

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IBM Tivoli Monitoring 基本概念

Rick Huang
Advisory I/T Specialist
IBM Software Group

V1.0
2/25/2005

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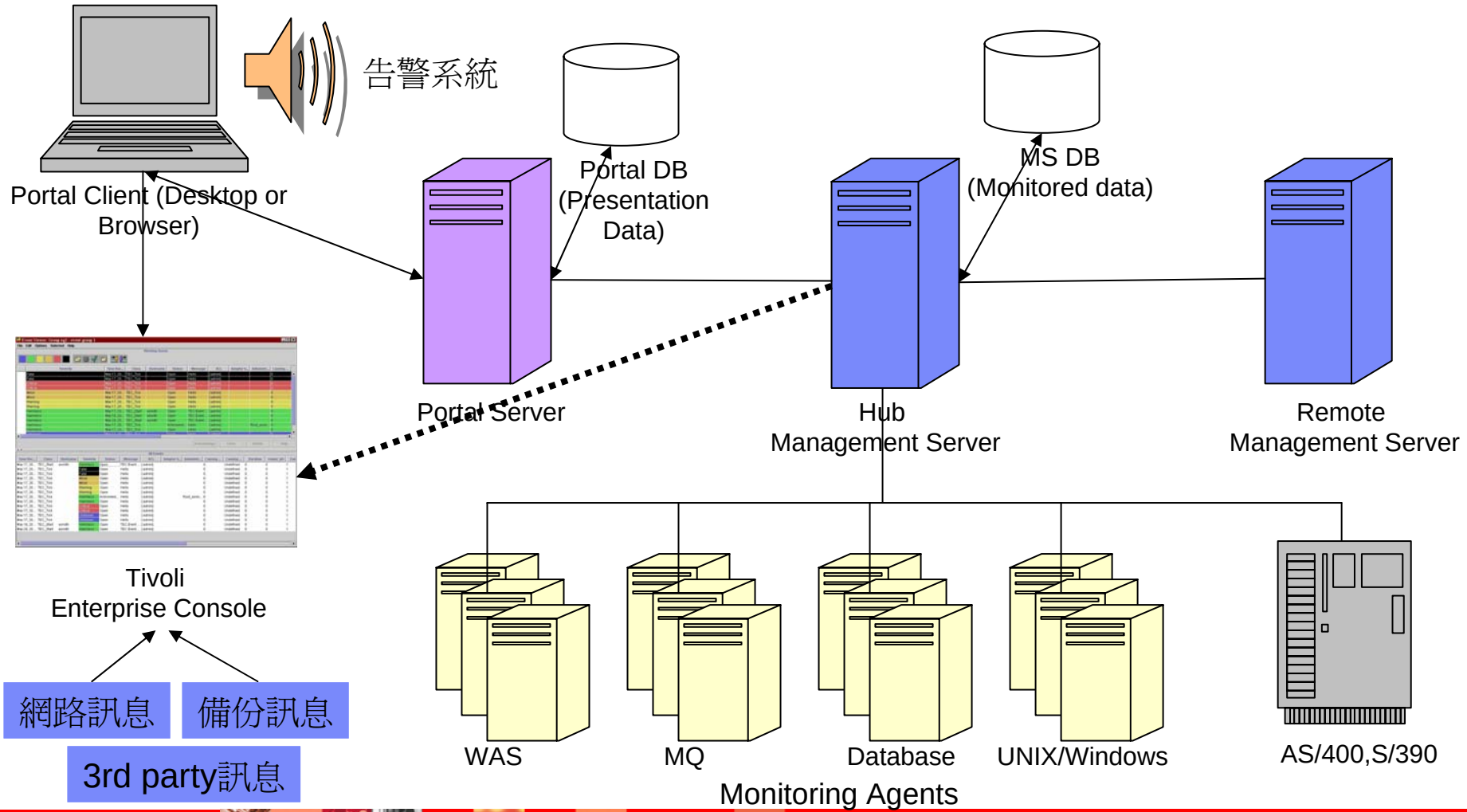
IBM Tivoli Monitoring architecture



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IBM Tivoli Monitoring 產品簡介

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功能特性

- 資料收集來源
  - Monitoring Agents
  - Universal Agents
    - ODBC
    - Log files
    - API
    - Socket
    - Script
    - SNMP
- 透過臨界值(threshold)的判斷來產生事件
- 依據事件的產生來執行自動回應工作
- 即時效能資料的展現
- 操作介面：browser or desktop application
- 完整的歷史資料收集與詳盡的各式報表

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管理特色

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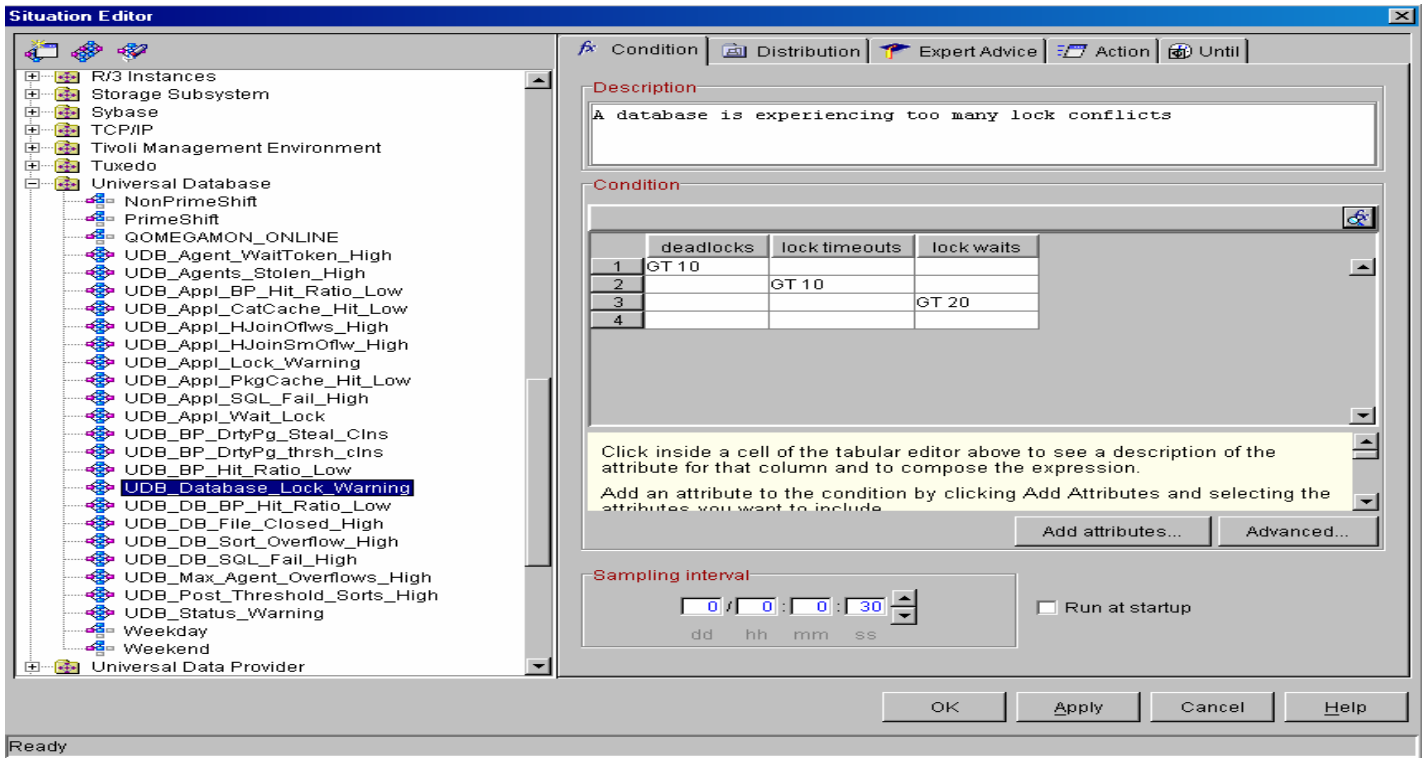
透過臨界值(threshold)的判斷來產生事件

- Multiple thresholds linked by Boolean logic for determining complex problems
- Allows for an automated/reflex action in response to violation



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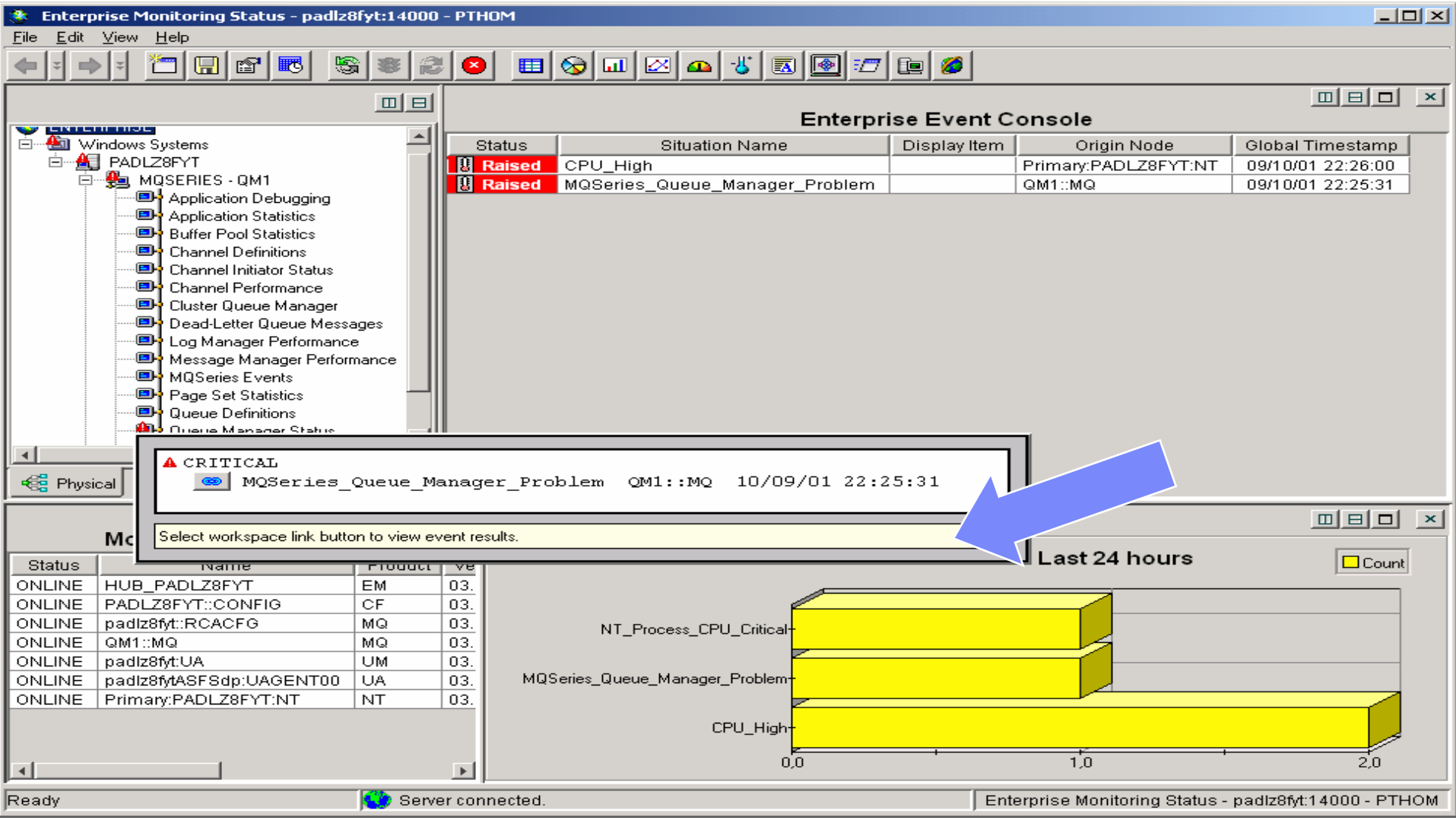
發現問題時提出警告訊息



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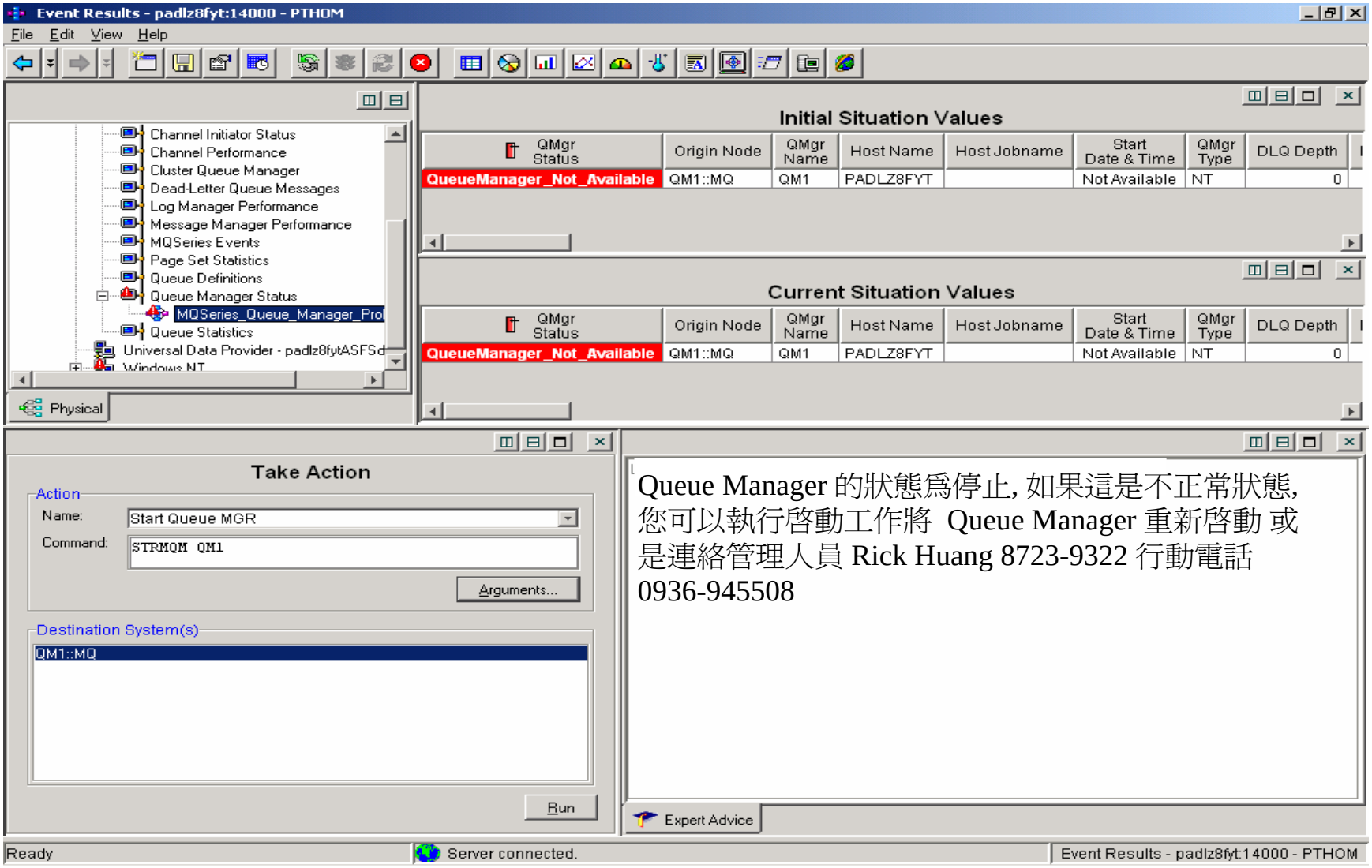
有事件產生, 執行自動回應工作



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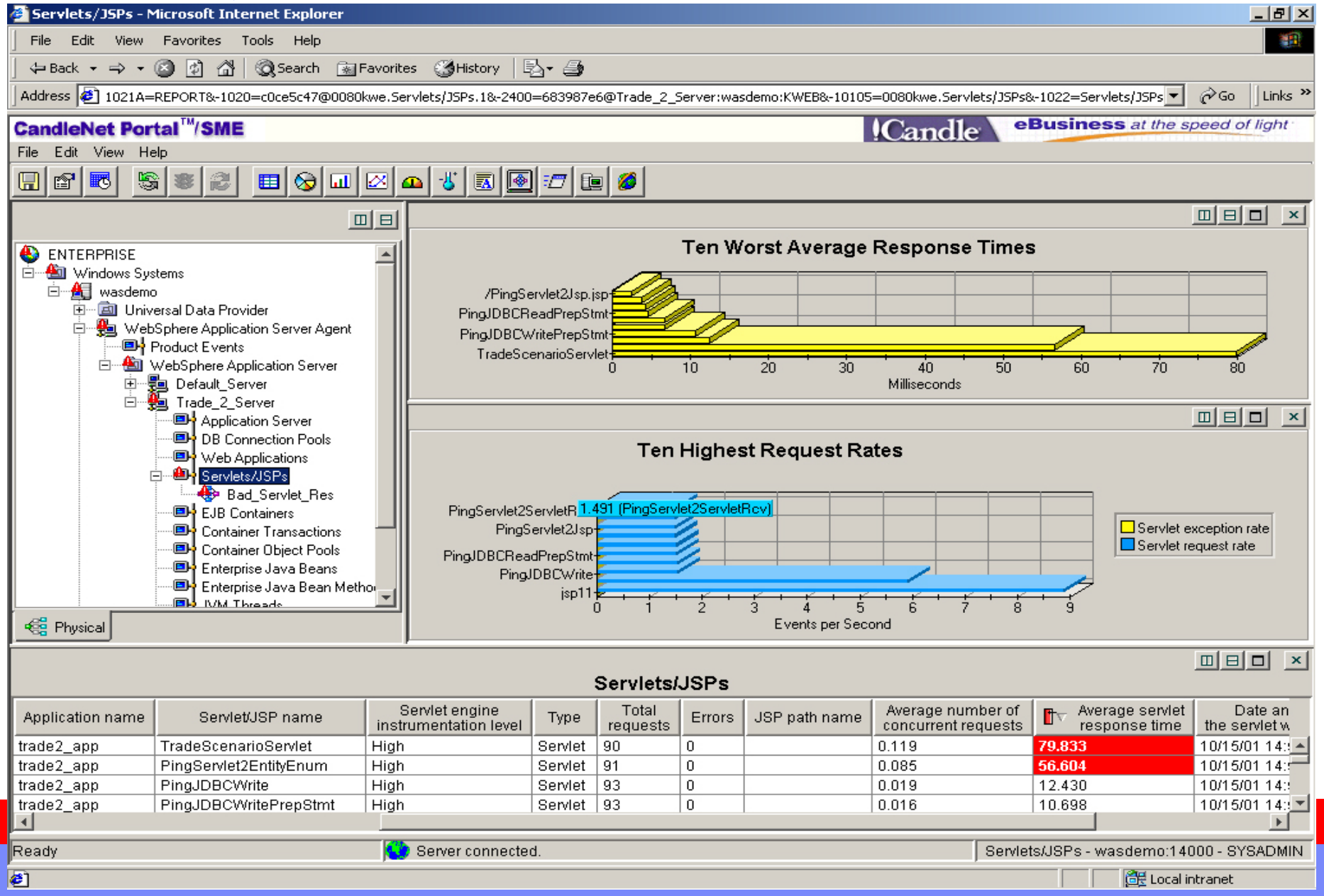
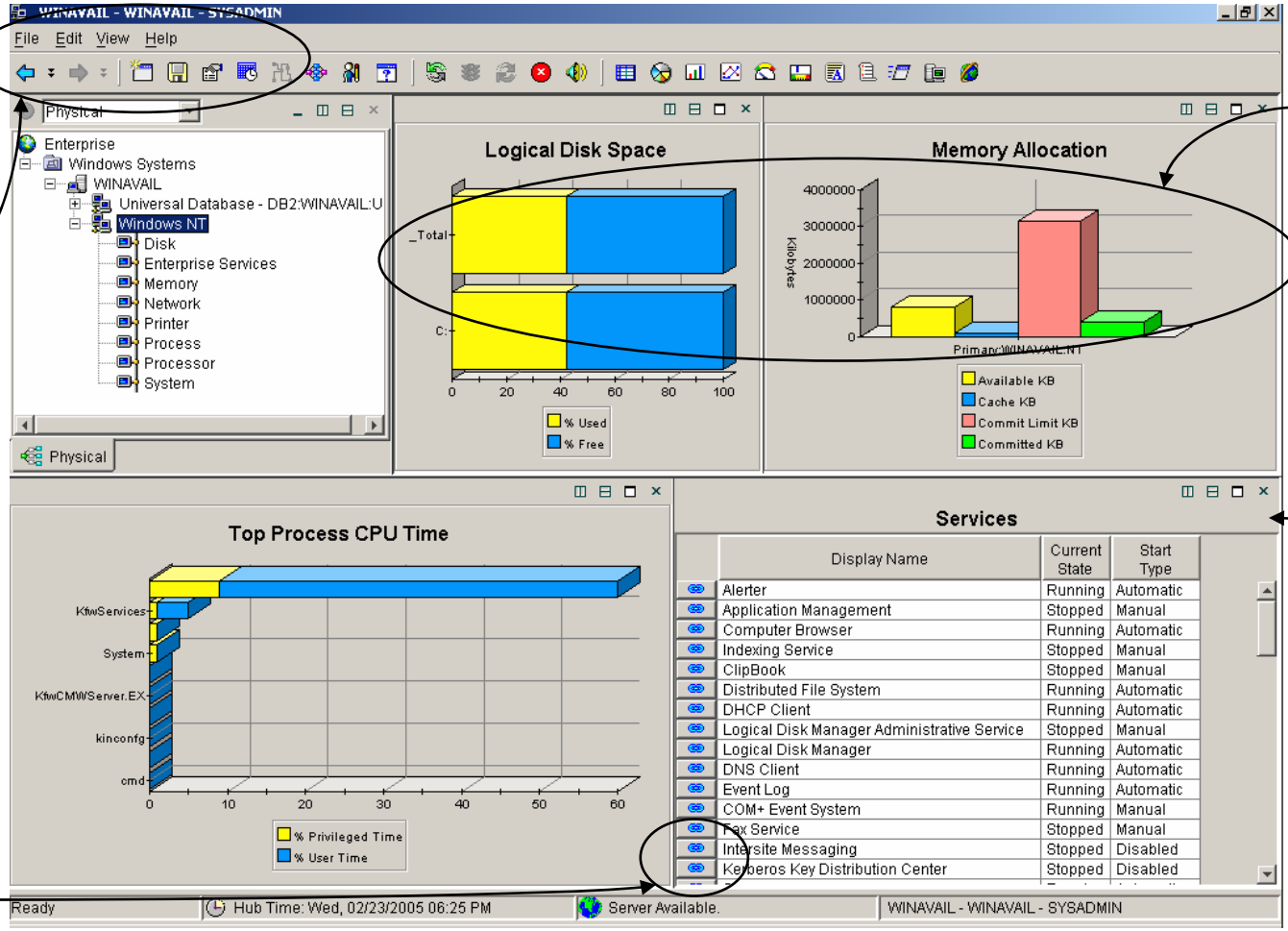
即時效能資料的展現


Servlets/JSPs - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address 1021A=REPORT&-1020=c0ce5c47@0080kwe.Servlets/JSPs.1&-2400=683987e6@Trade_2_Server:wasdemo:KWEB&-10105=0080kwe.Servlets/JSPs&-1022=Servlets/JSPs
Go Links
CandleNet Portal™/SME
Candle eBusiness at the speed of light
File Edit View Help
ENTERPRISE
Windows Systems
wasdemo
Universal Data Provider
WebSphere Application Server Agent
Product Events
WebSphere Application Server
Default_Server
Trade_2_Server
Application Server
DB Connection Pools
Web Applications
Servlets/JSPs
Bad_Servlet_Res
EJB Containers
Container Transactions
Container Object Pools
Enterprise Java Beans
Enterprise Java Bean Metho
Physical
Ten Worst Average Response Times
/PingServlet2Jsp.jsp
PingJDBCReadPrepStmt
PingJDBCWritePrepStmt
TradeScenarioServlet
0 10 20 30 40 50 60 70 80
Milliseconds
Ten Highest Request Rates
PingServlet2ServletR
1.491 (PingServlet2ServletRcv)
PingServlet2Jsp
PingJDBCReadPrepStmt
PingJDBCWrite
jsp11
0 1 2 3 4 5 6 7 8 9
Events per Second
Servlet exception rate
Servlet request rate
Servlets/JSPs
Application name | Servlet/JSP name | Servlet engine instrumentation level | Type | Total requests | Errors | JSP path name | Average number of concurrent requests | Average servlet response time | Date an the servlet w
trade2_app | TradeScenarioServlet | High | Servlet | 90 | 0 | | 0.119 | 79.833 | 10/15/01 14:
trade2_app | PingServlet2EntityEnum | High | Servlet | 91 | 0 | | 0.085 | 56.604 | 10/15/01 14:
trade2_app | PingJDBCWrite | High | Servlet | 93 | 0 | | 0.019 | 12.430 | 10/15/01 14:
trade2_app | PingJDBCWritePrepStmt | High | Servlet | 93 | 0 | | 0.016 | 10.698 | 10/15/01 14:
Ready
Server connected.
Servlets/JSPs - wasdemo:14000 - SYSADMIN
Local intranet

操作介面介紹



Easy to use Browser controls

Personalized Views

Persistent customized workspaces for future use

Intelligent Linking

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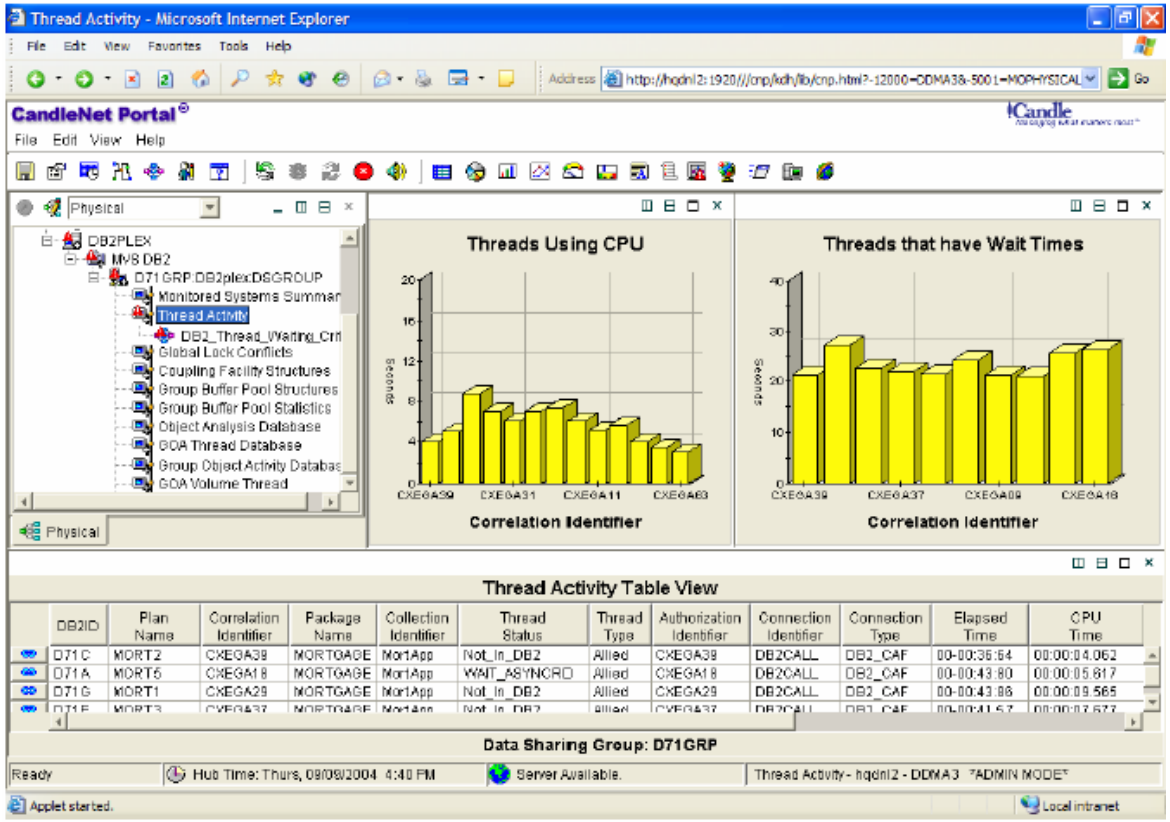
Resource View



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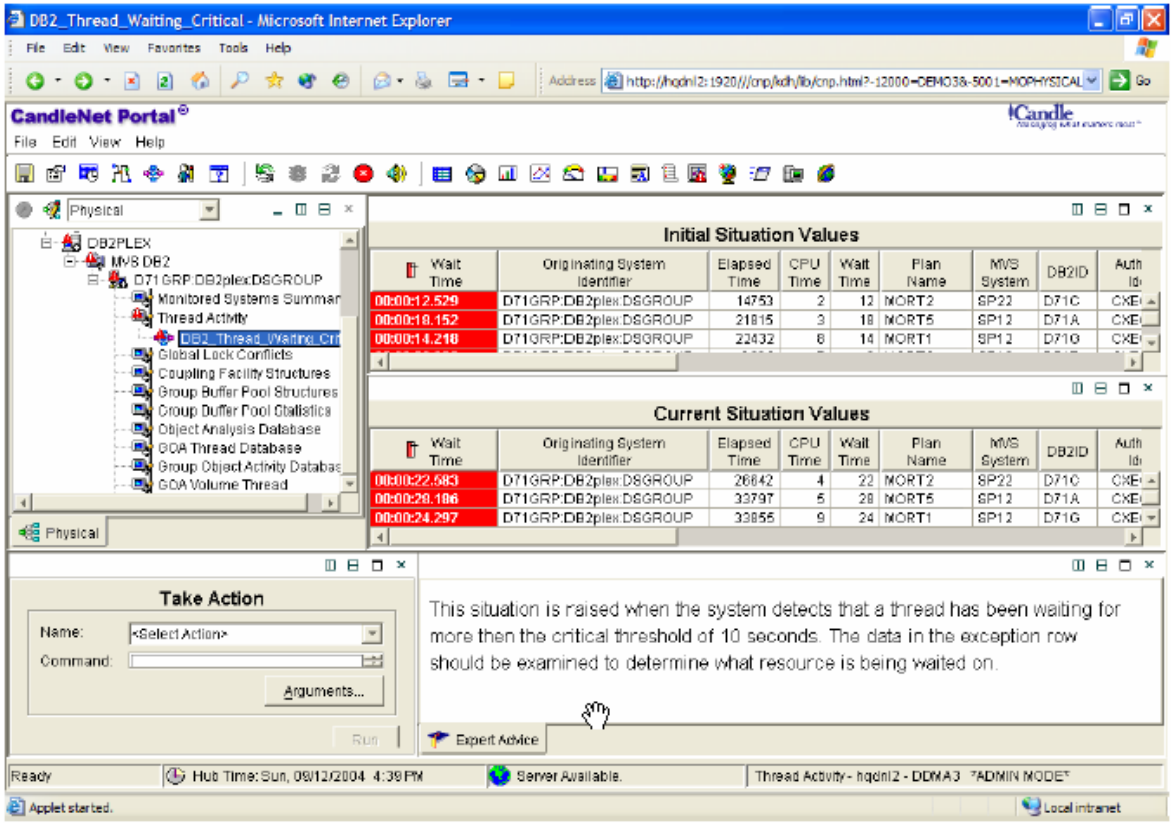
Event View



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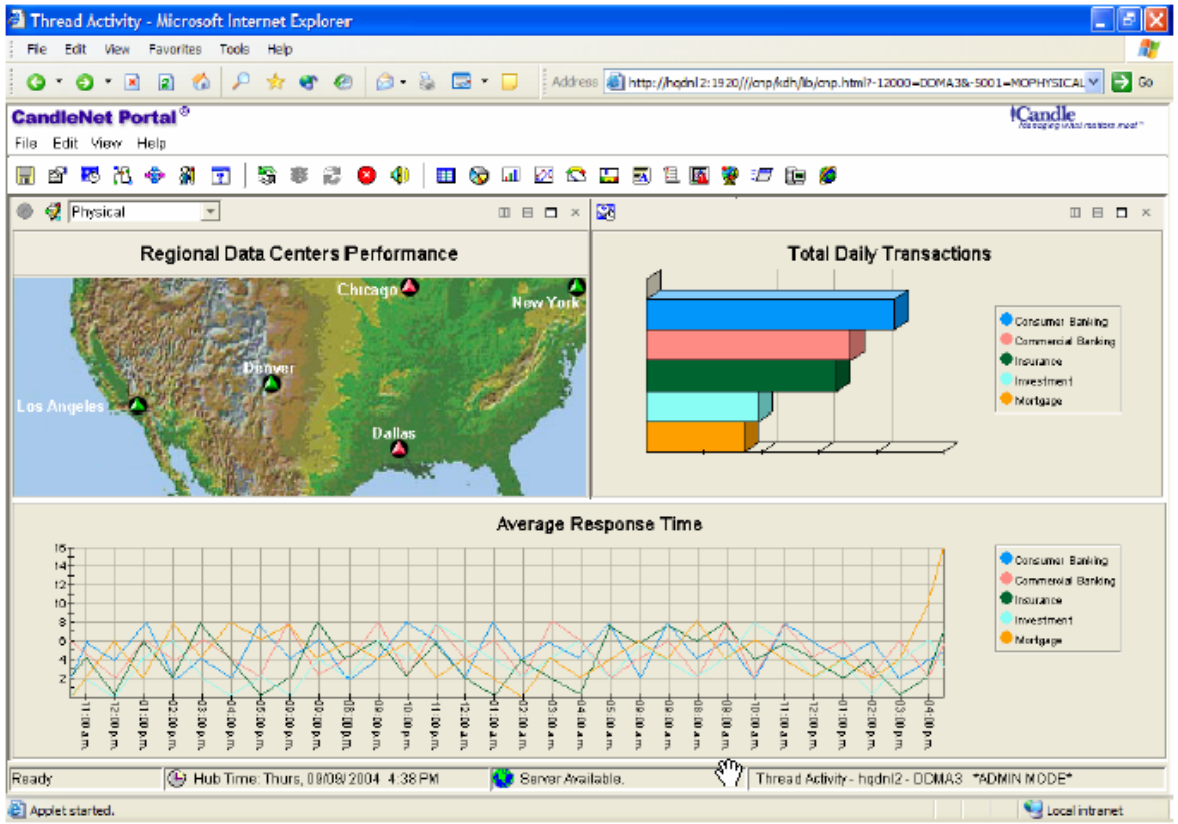
Graphic and Historical View



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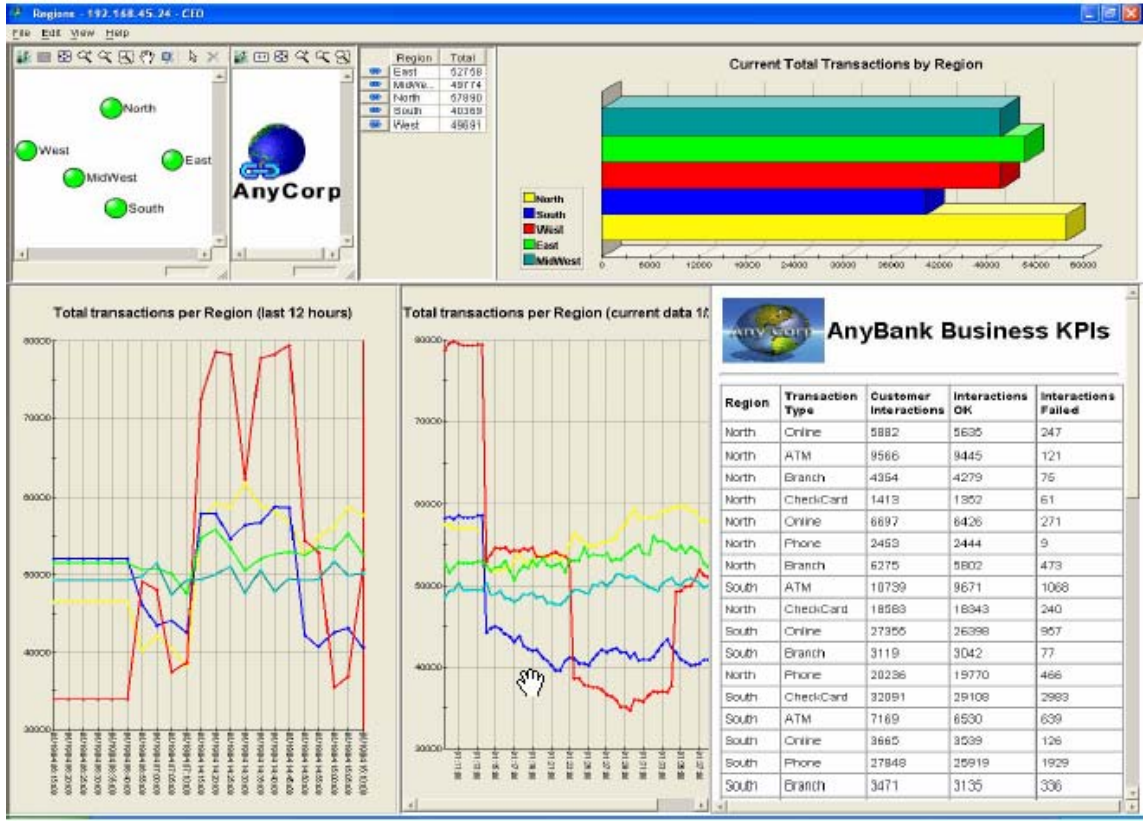
與自行開發的應用程式整合



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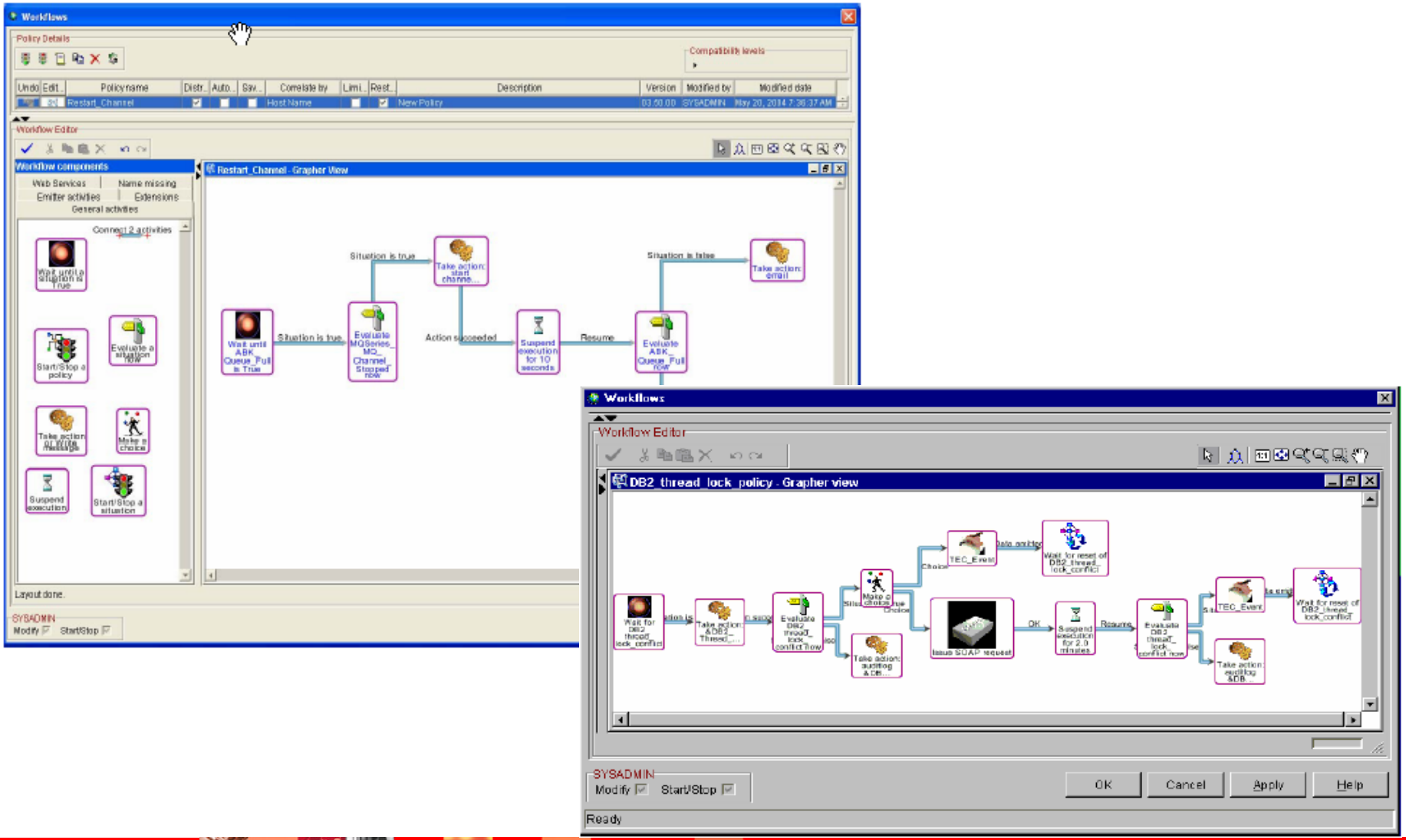
Workflow Automation



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完整的歷史資料收集與詳盡的各式報表

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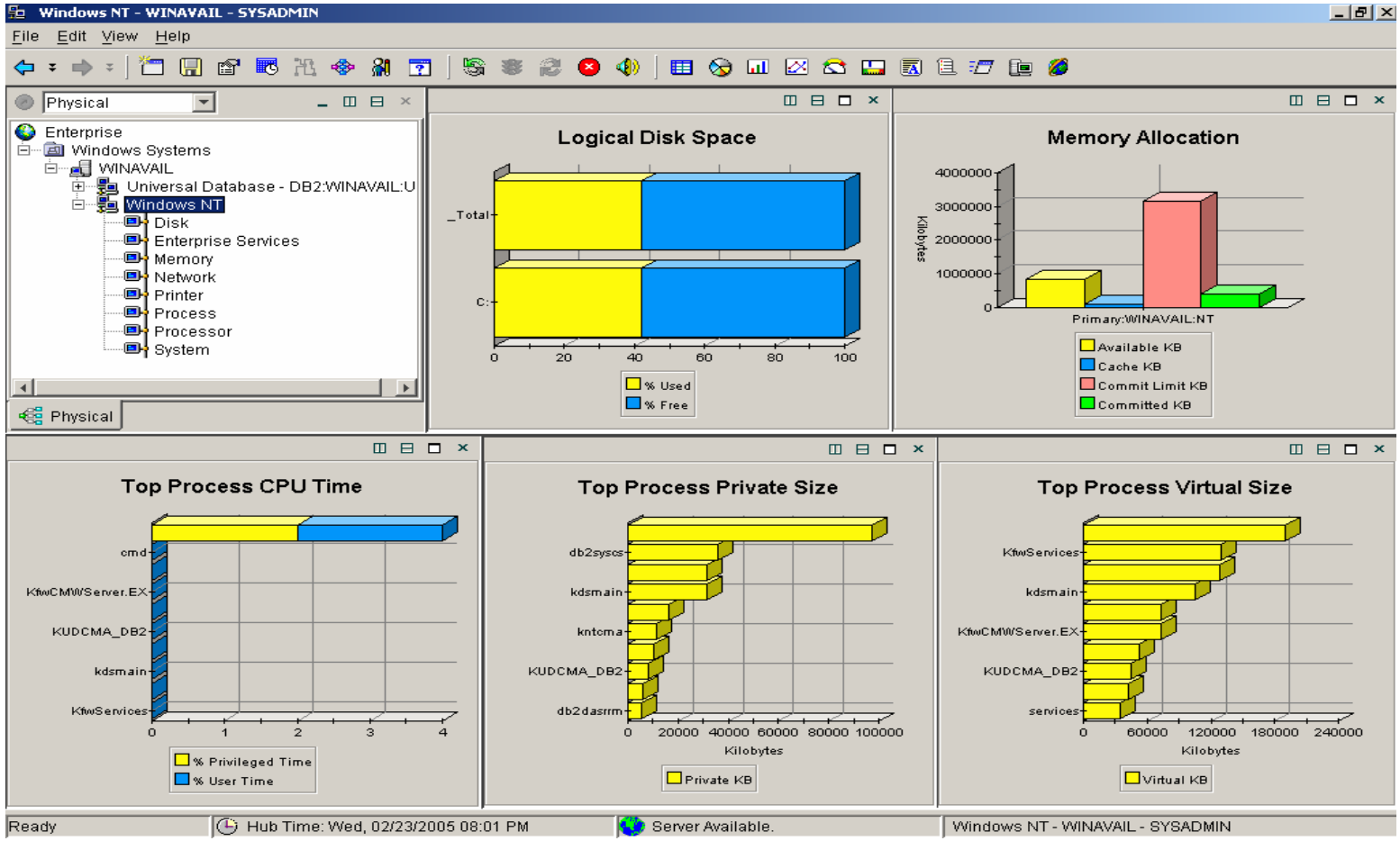
Windows Summary



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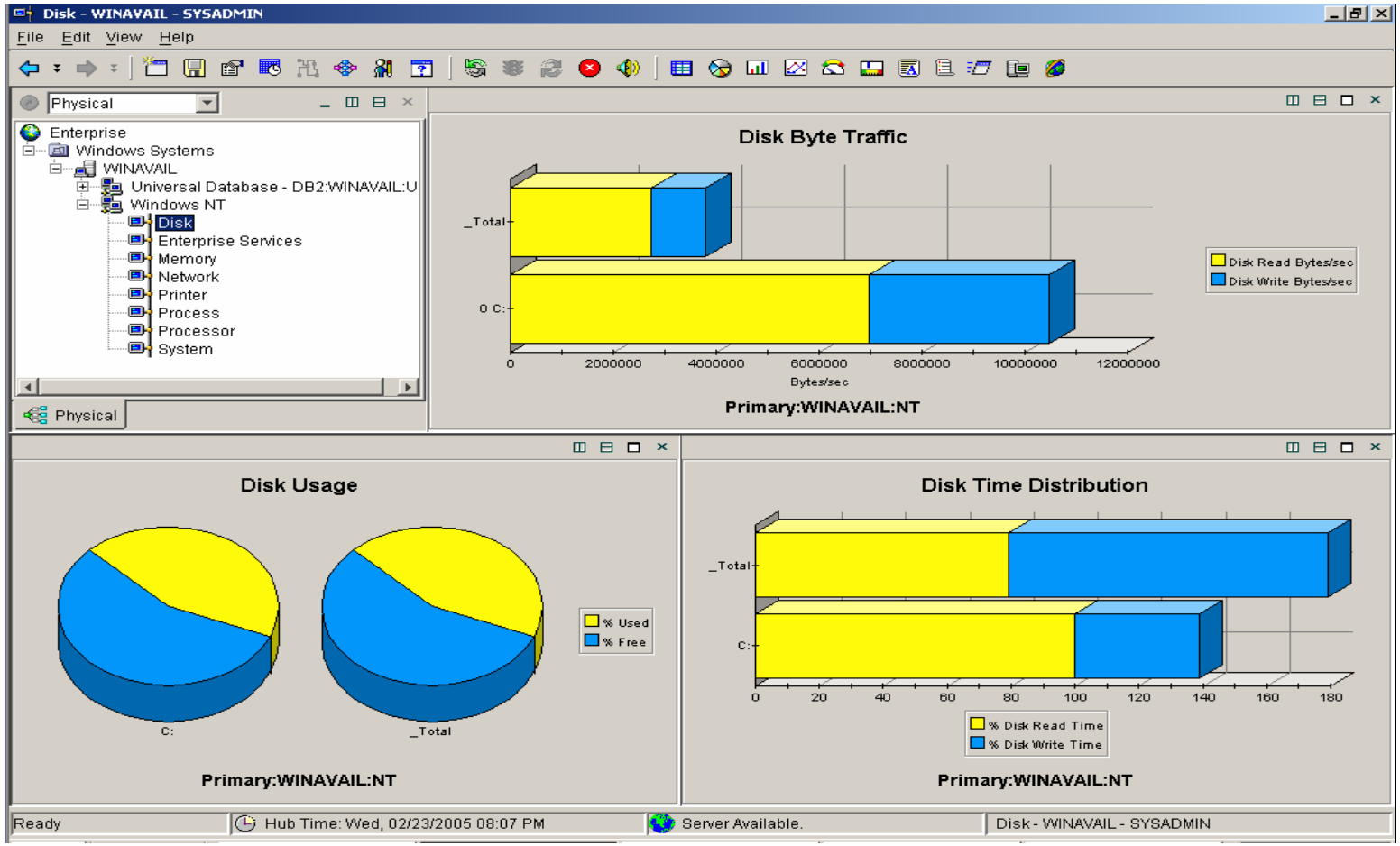
Windows Disk



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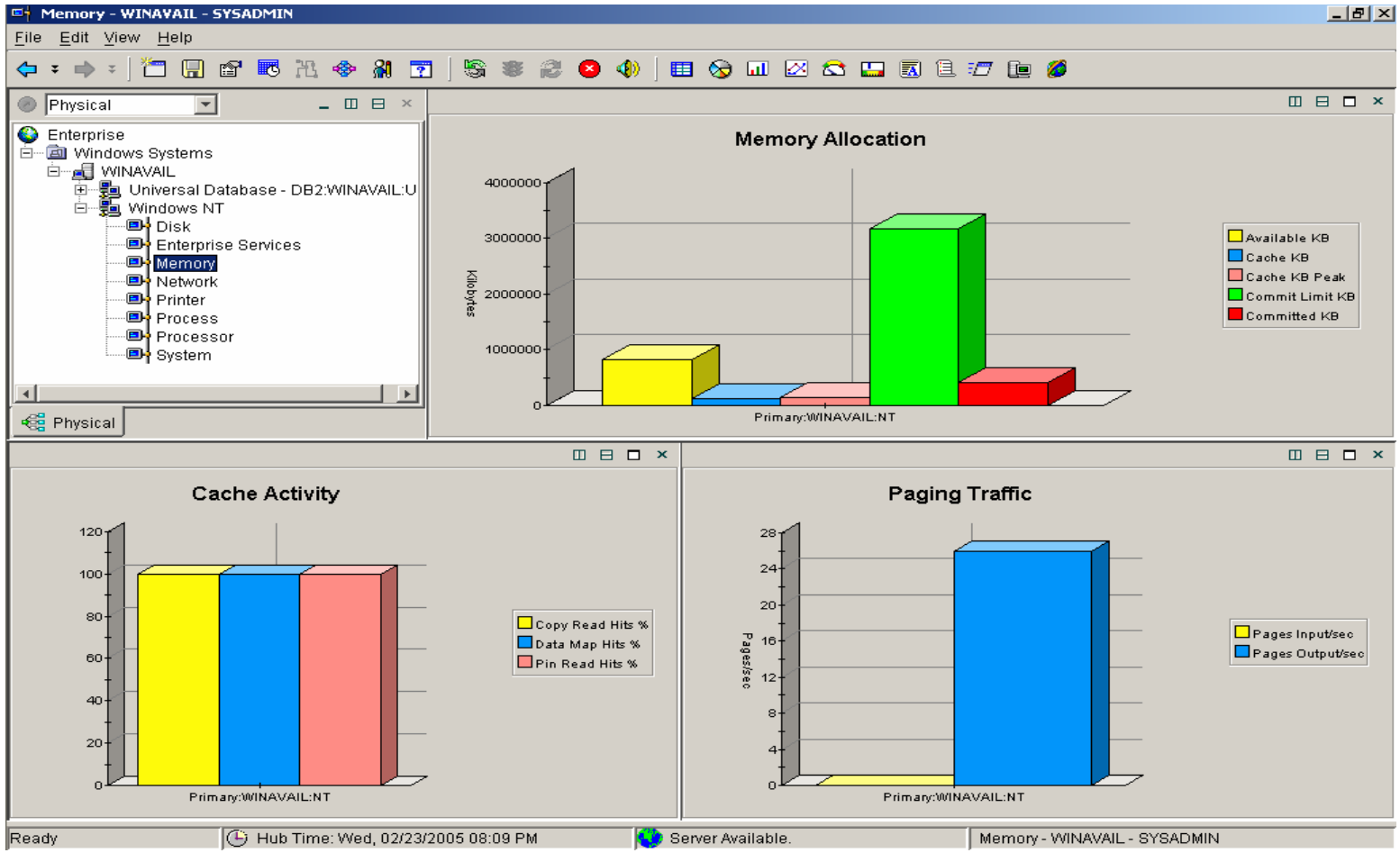
Windows Memory



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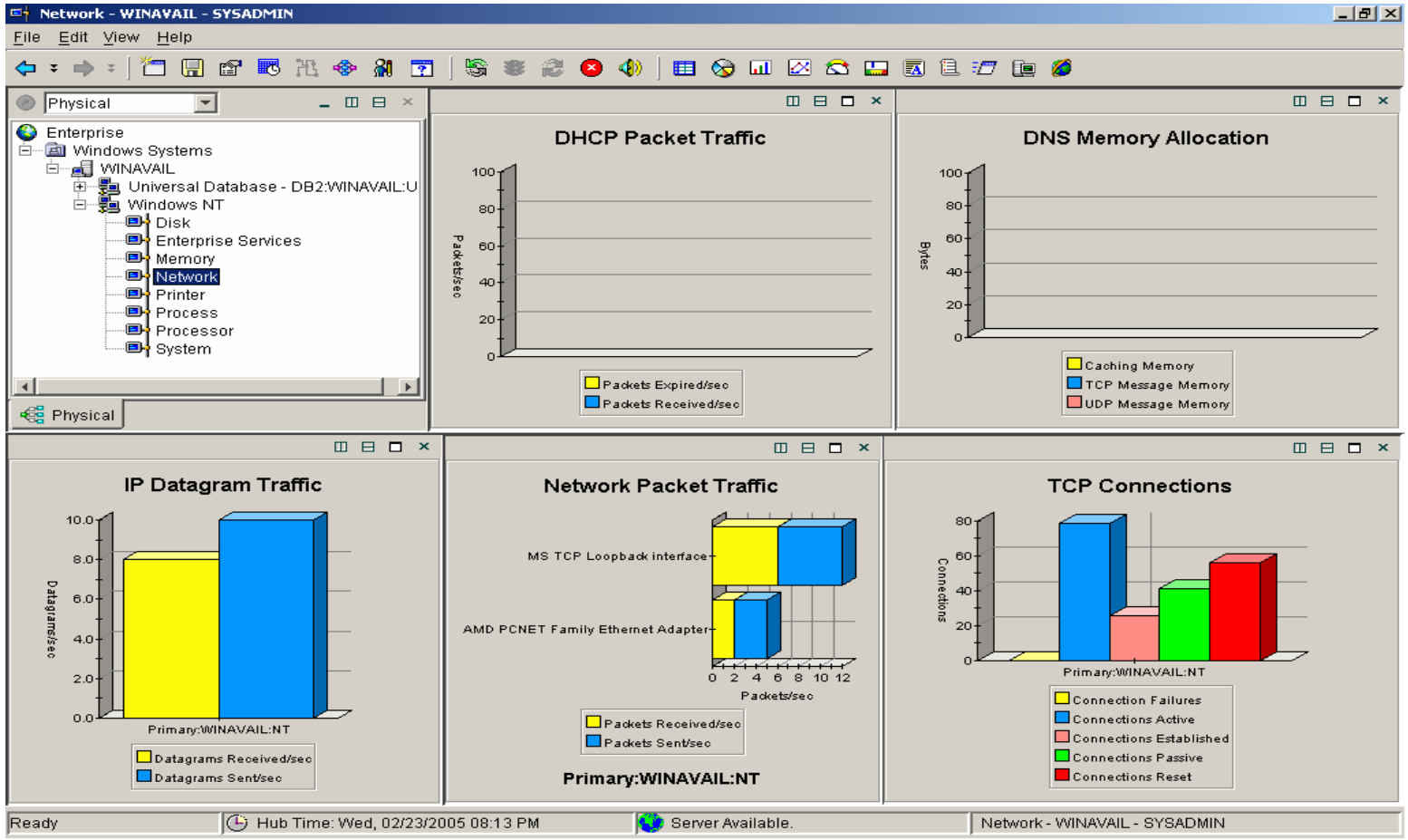
Windows Network



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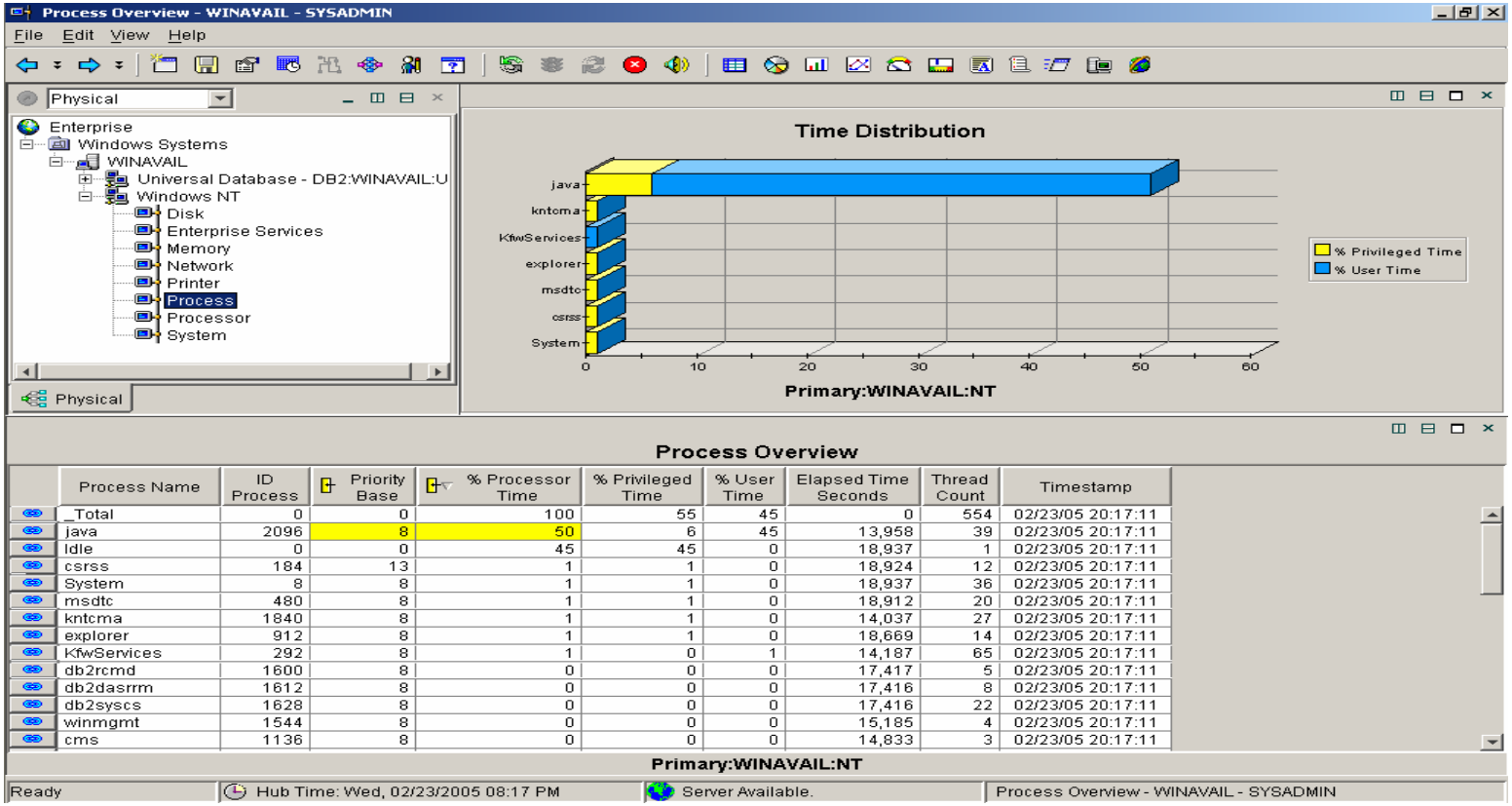
Windows Process Overview



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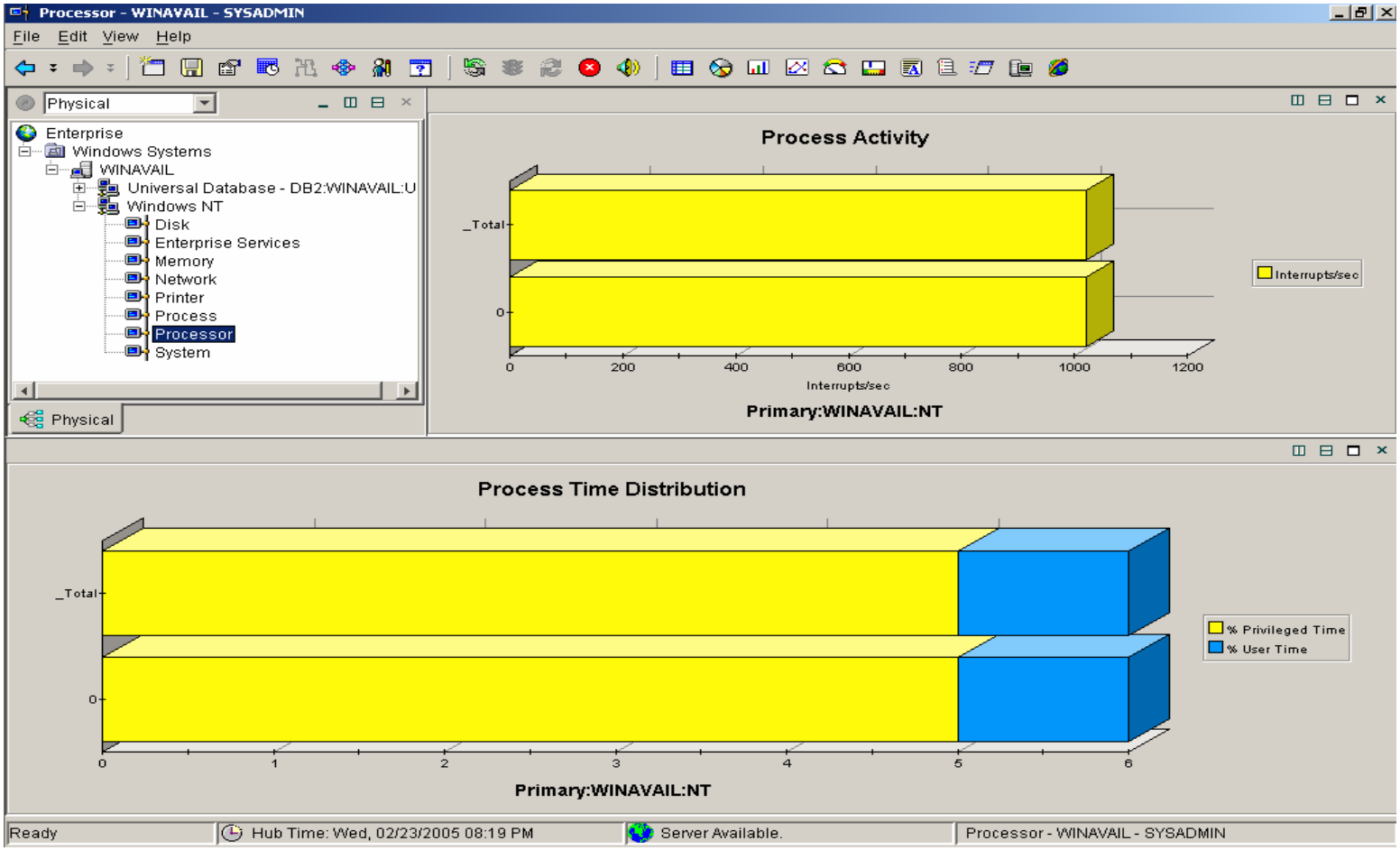
Windows Processor



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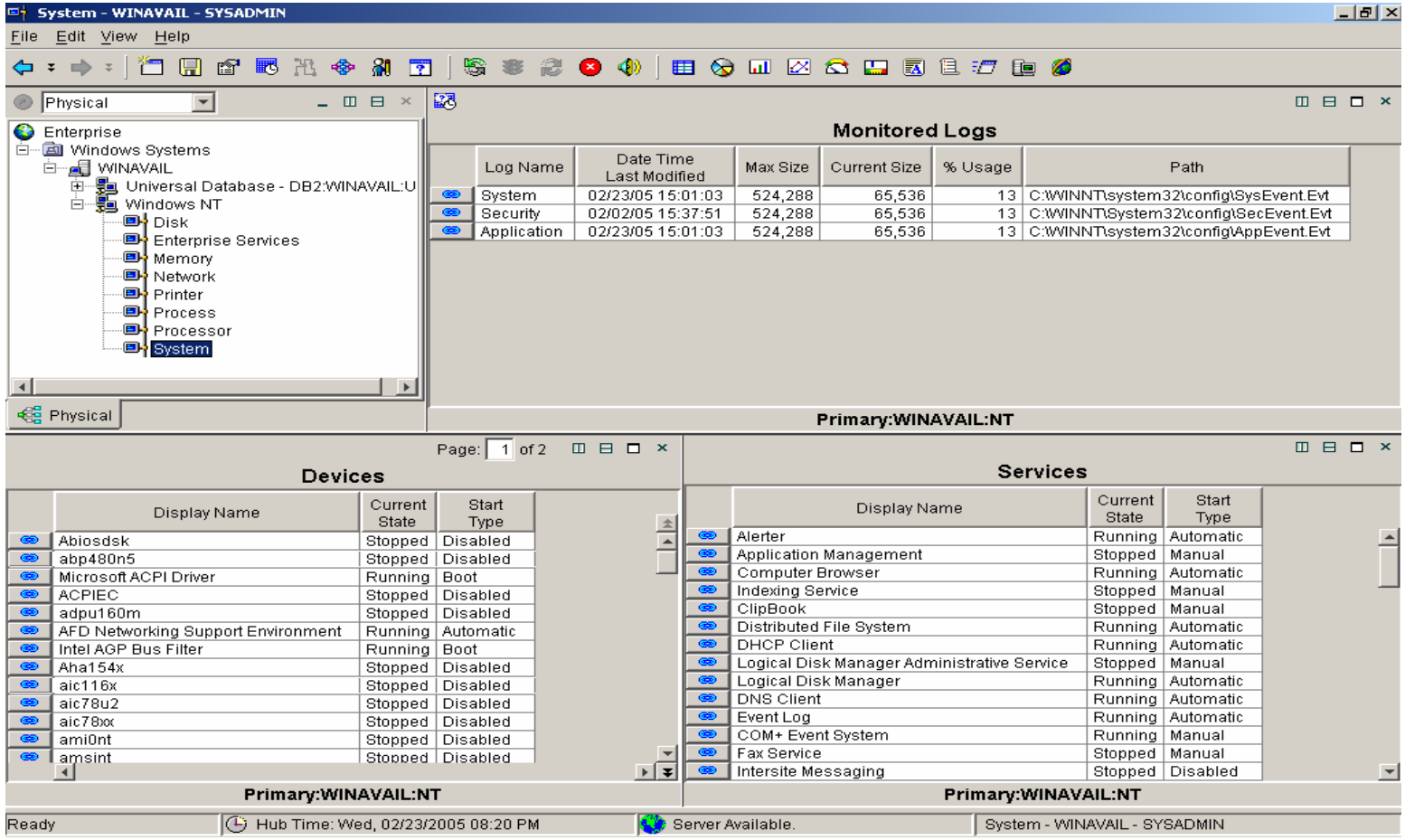
Windows System



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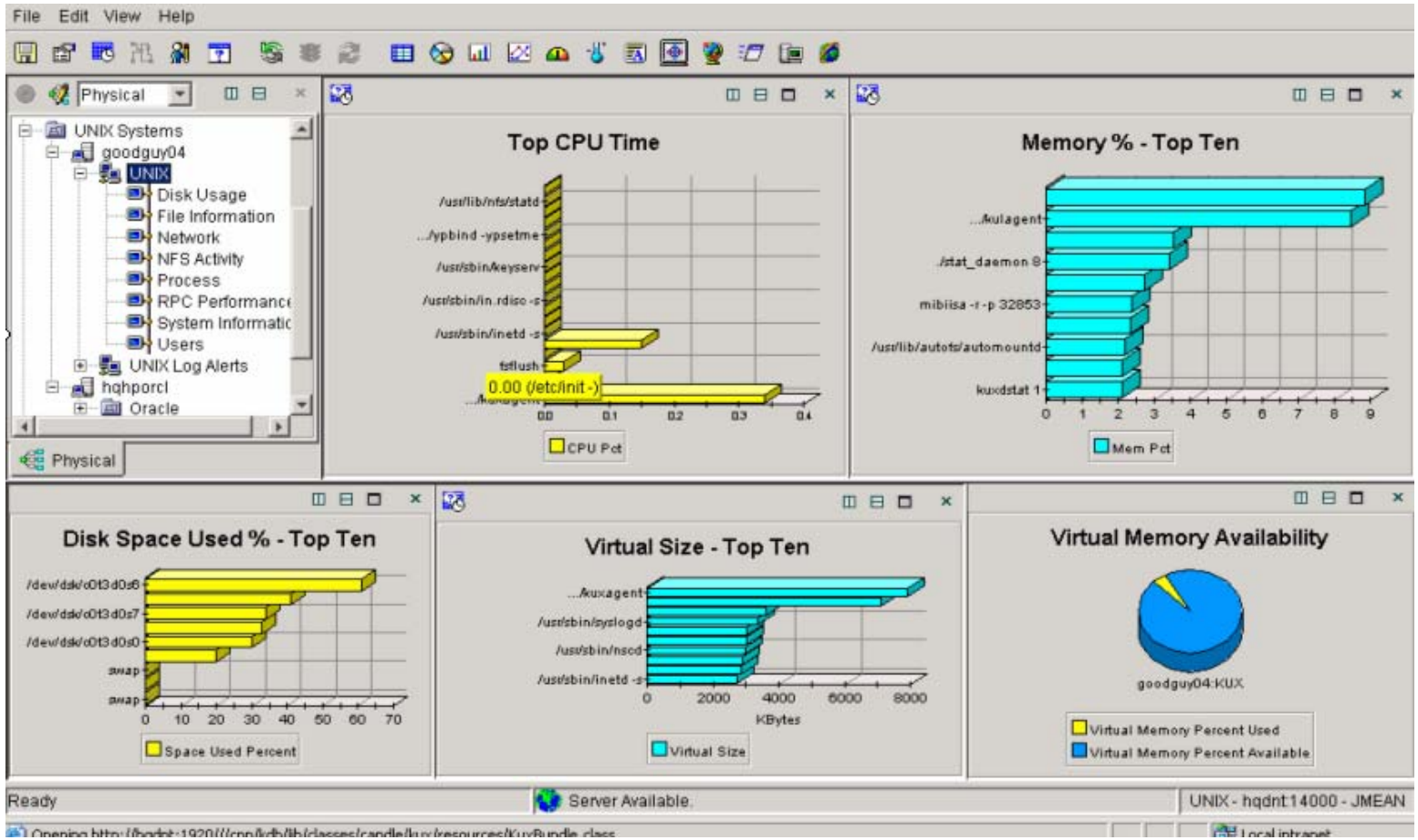
UNIX Summary



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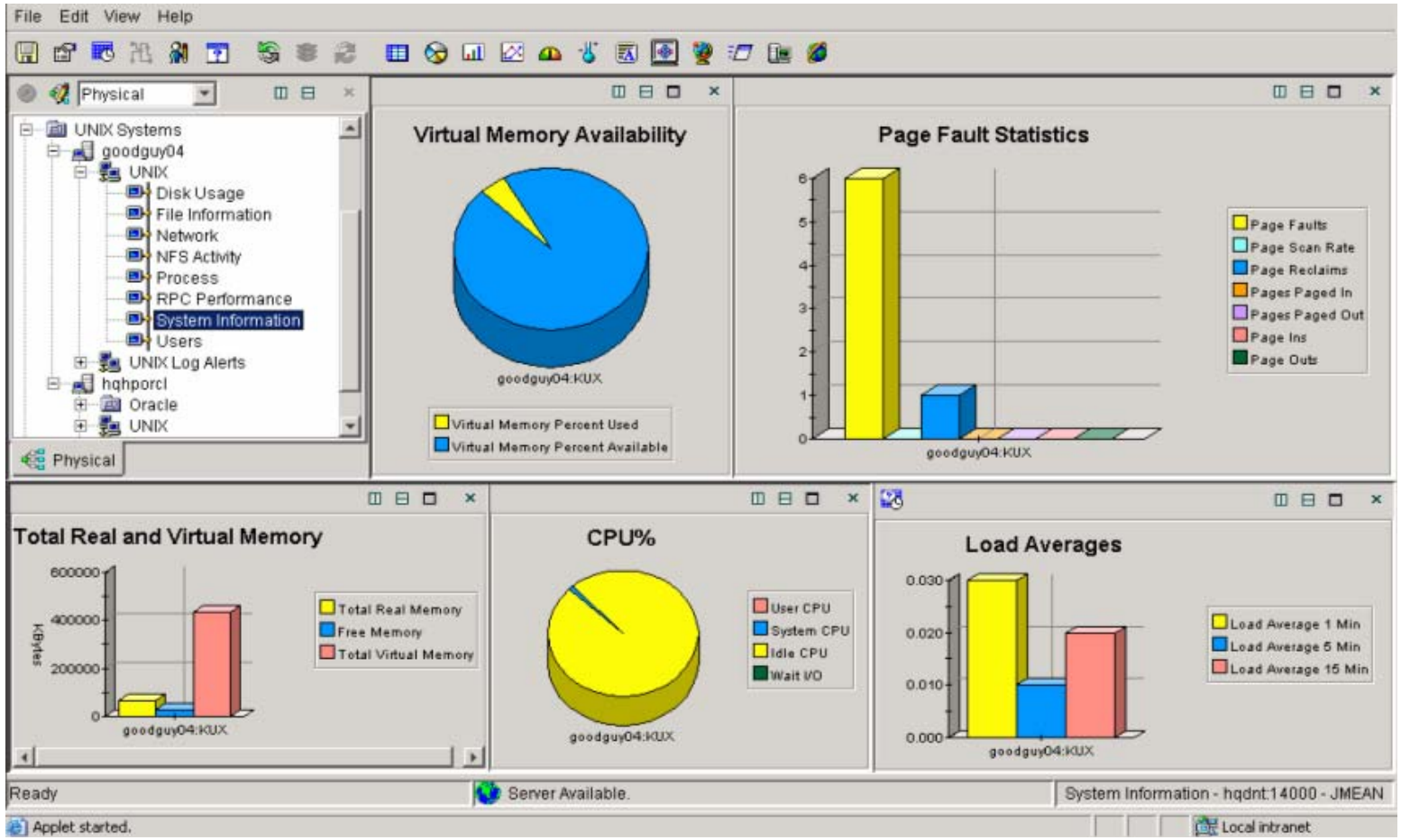
UNIX System Information



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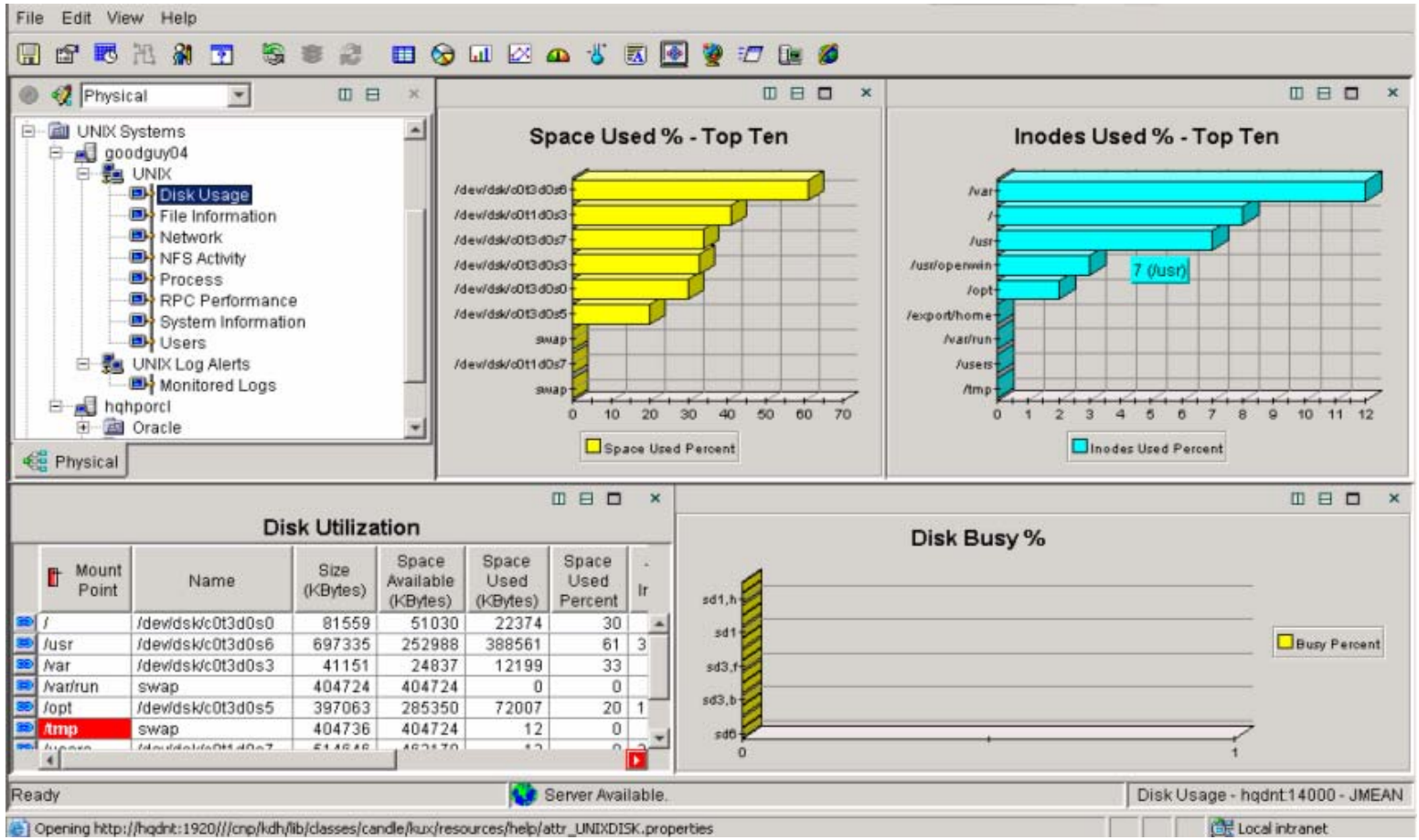
UNIX Disk Usage



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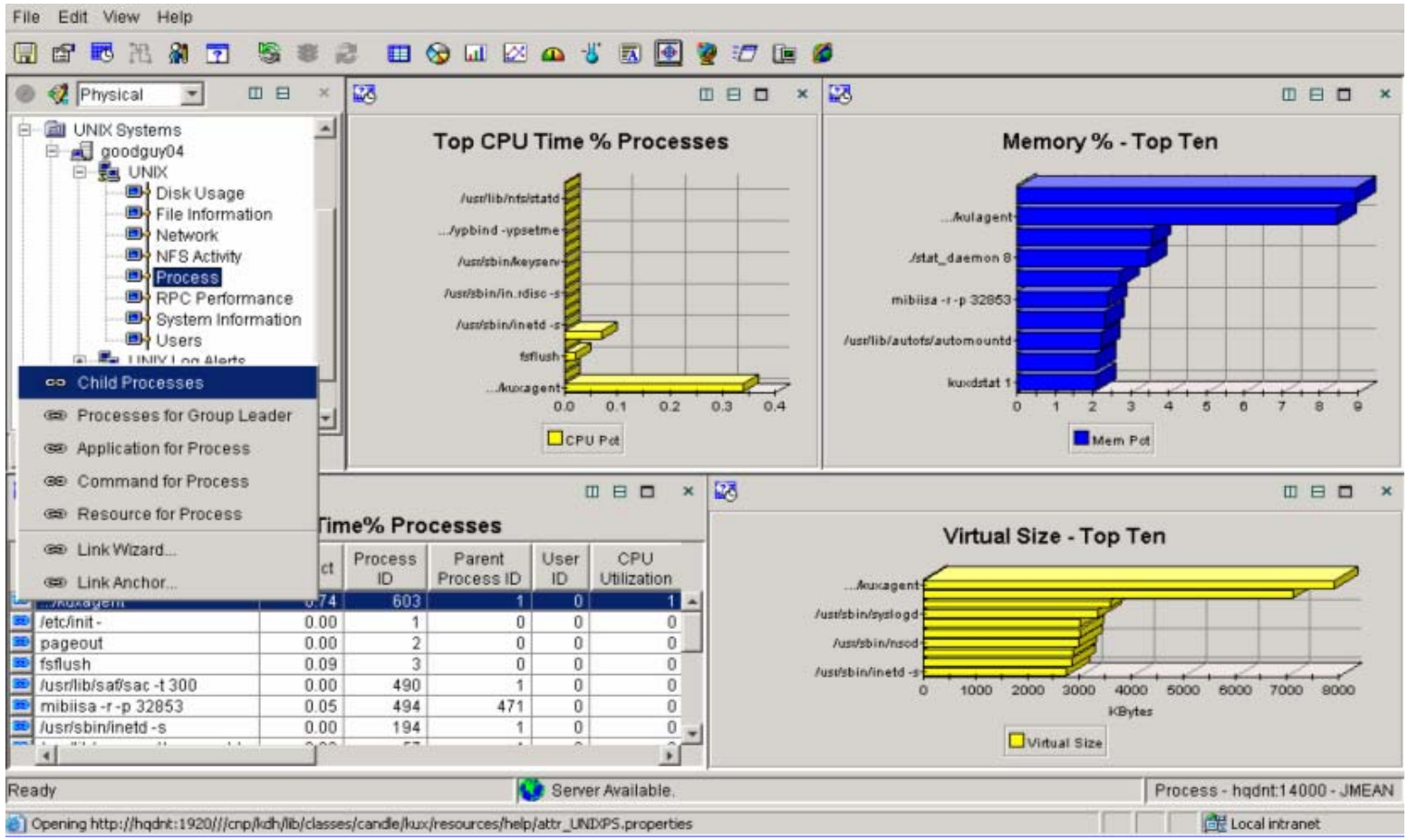
Unix Process



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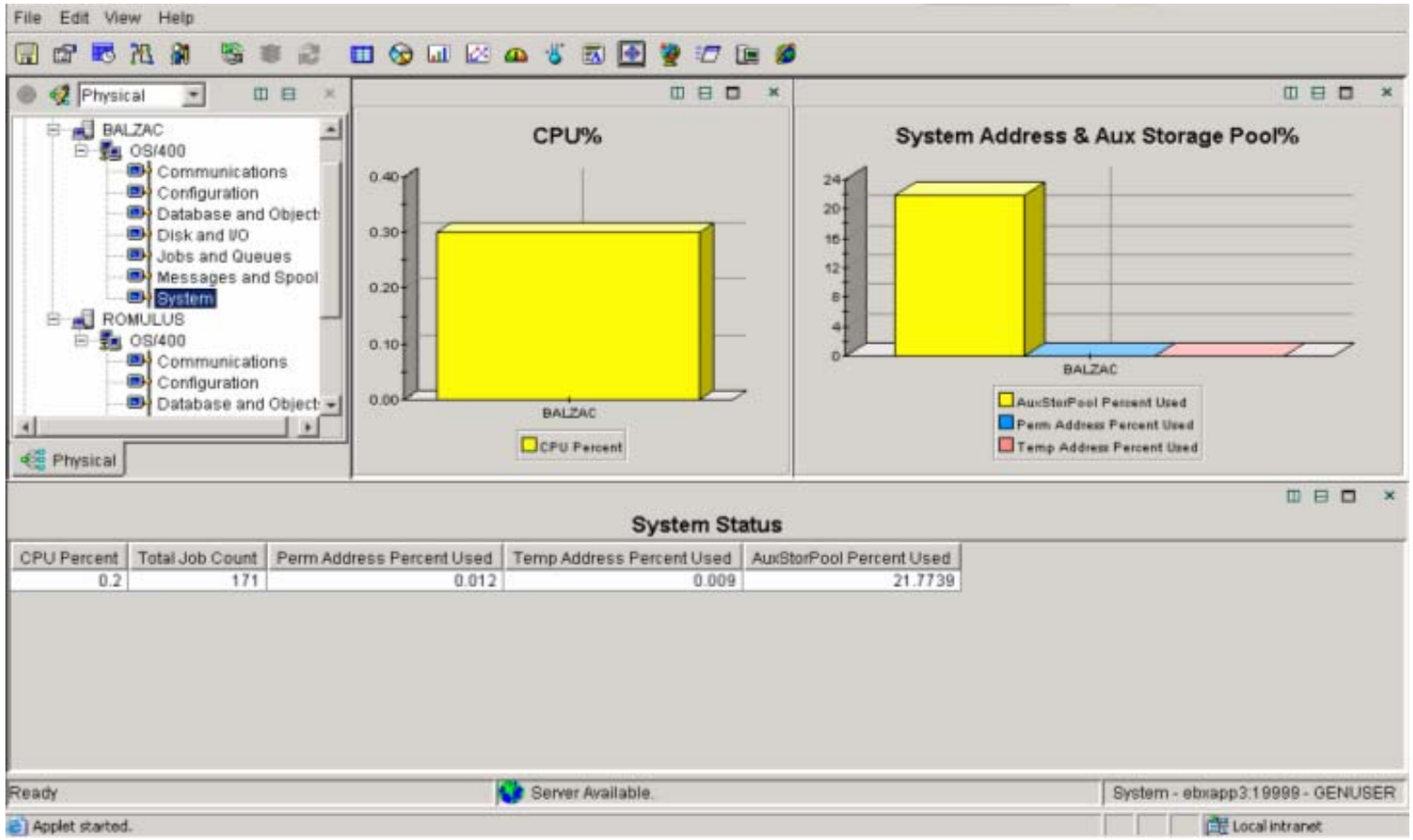
AS/400 System Info



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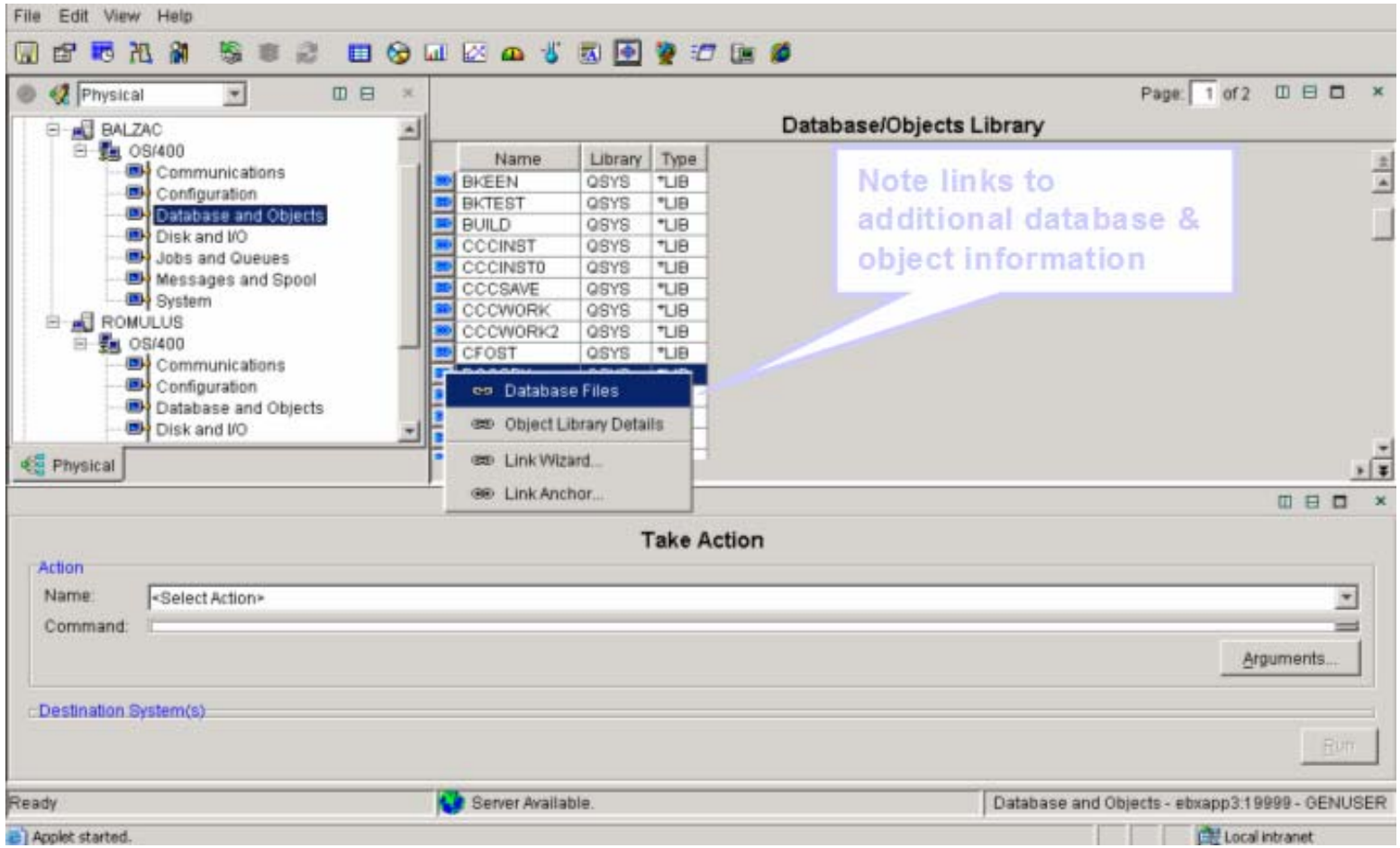
AS/400 Database & Objects



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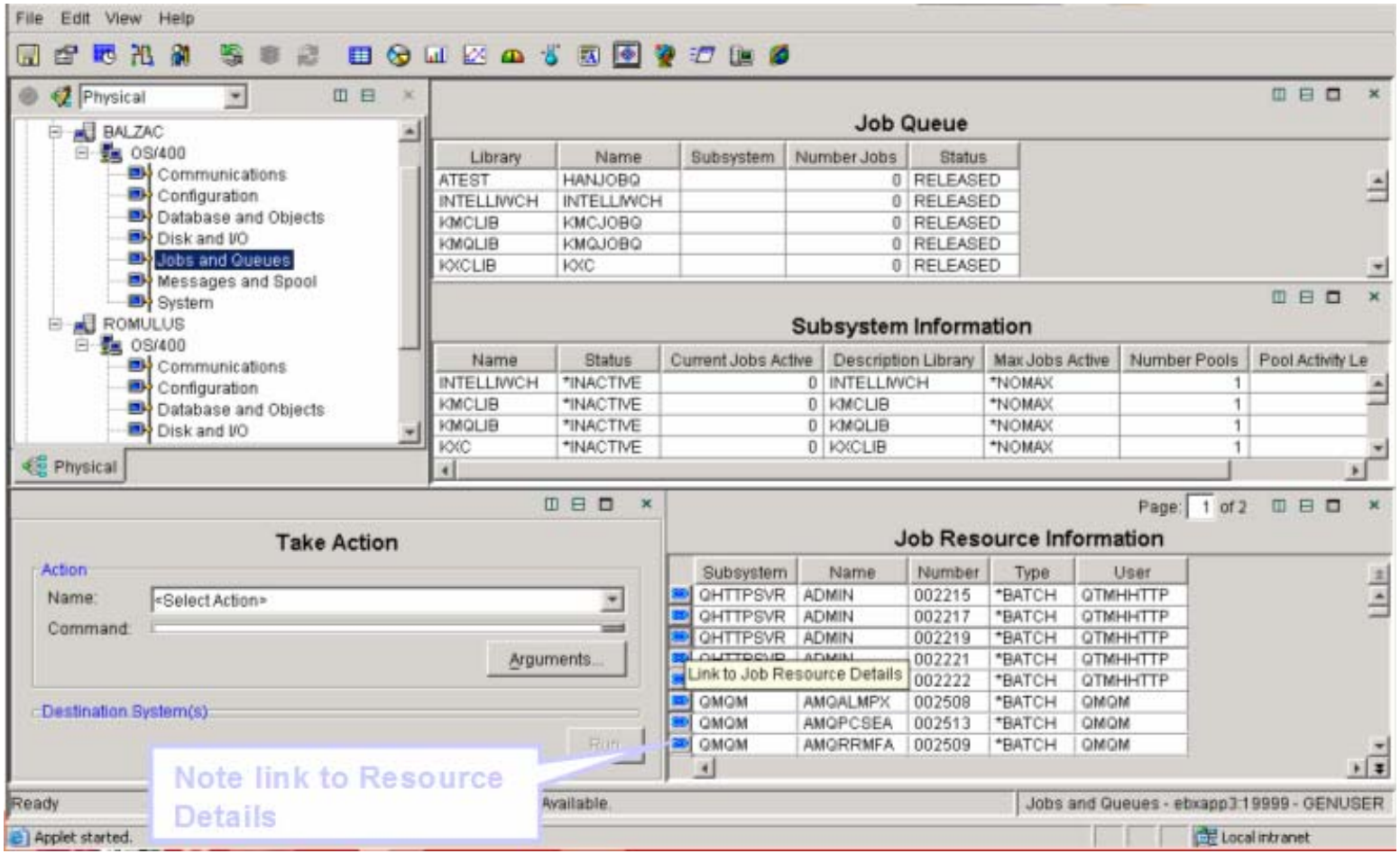
AS/400 Jobs & Queues



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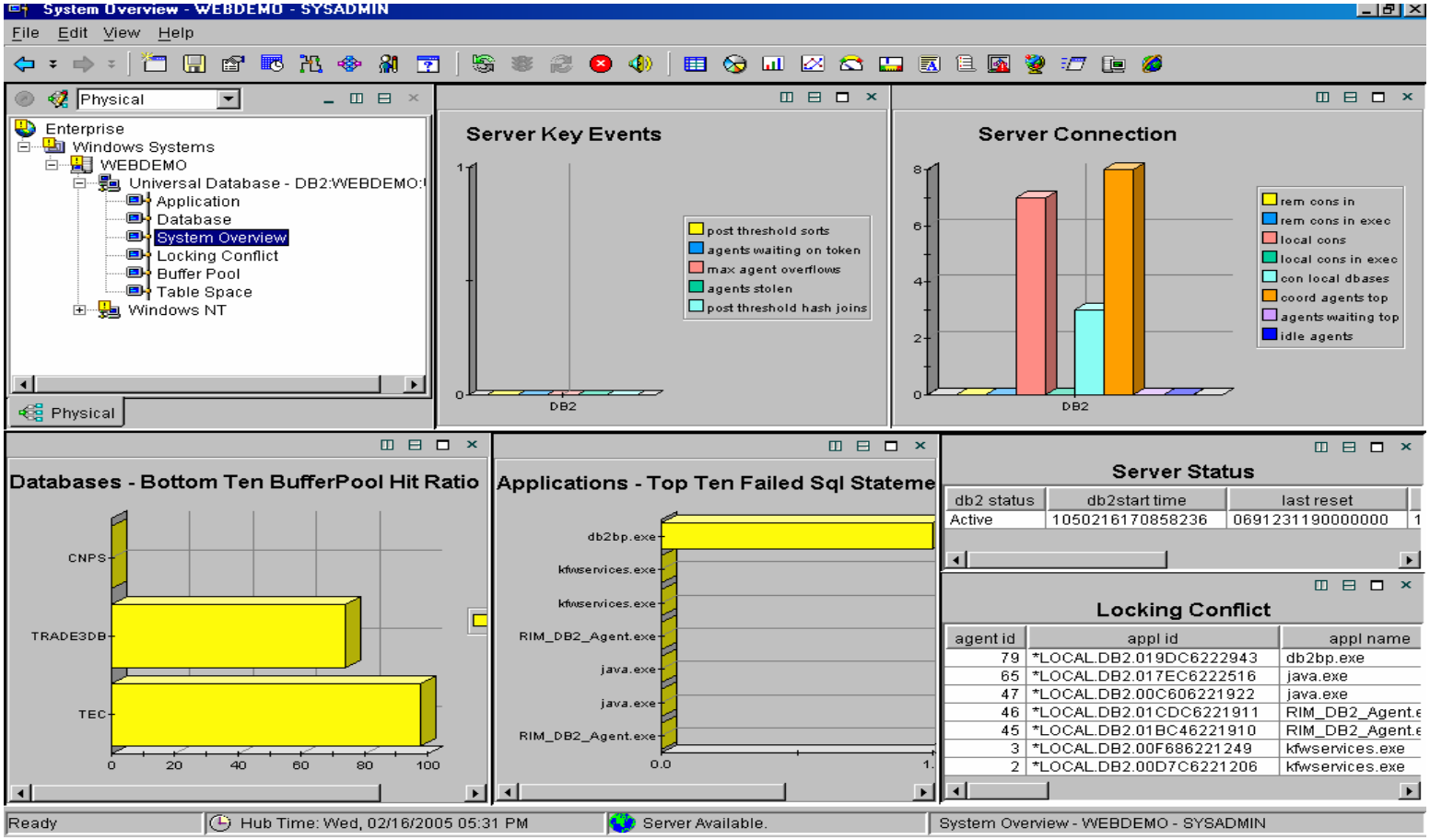
DB2 Server System Overview



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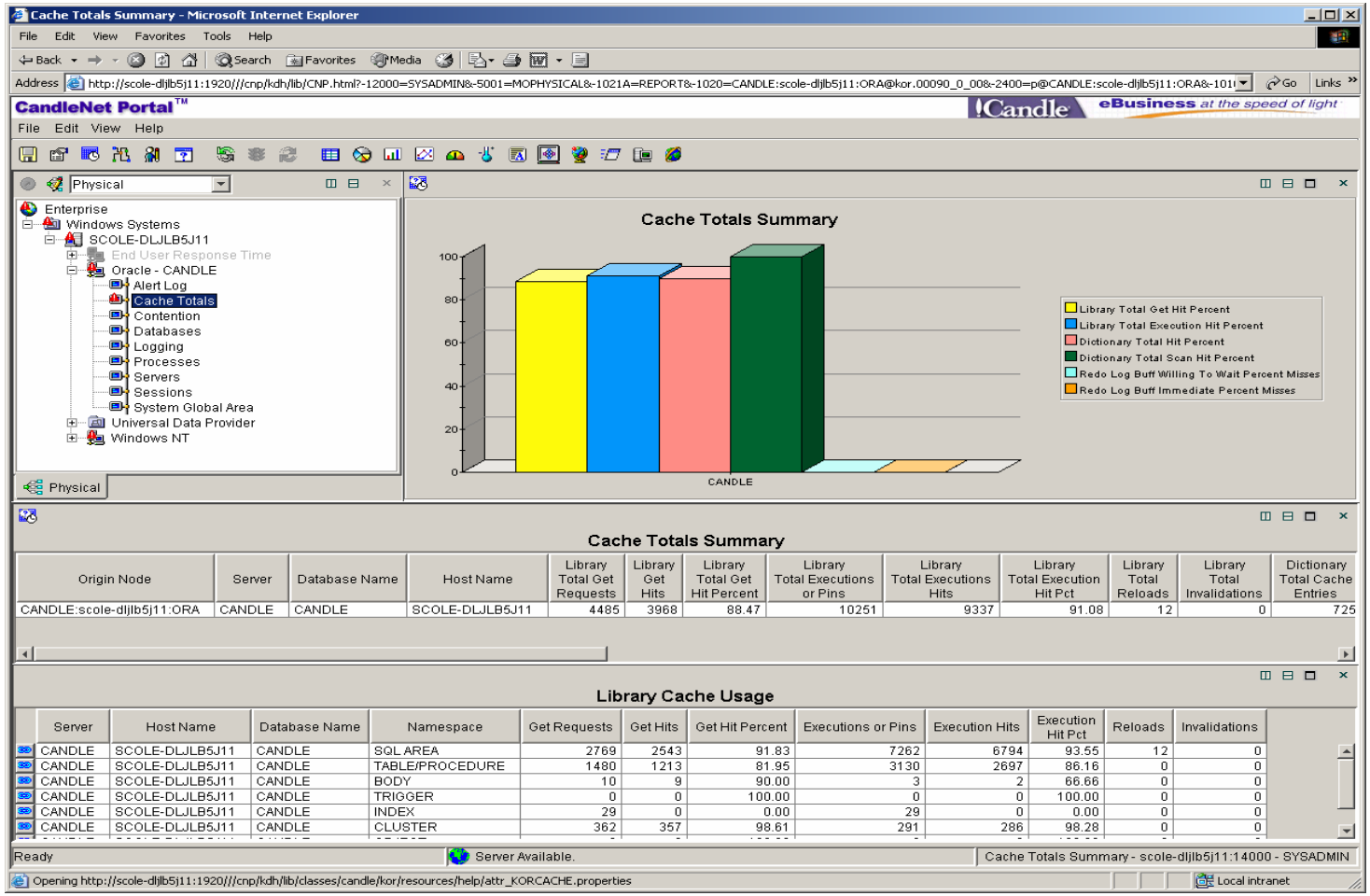
Oracle Summary



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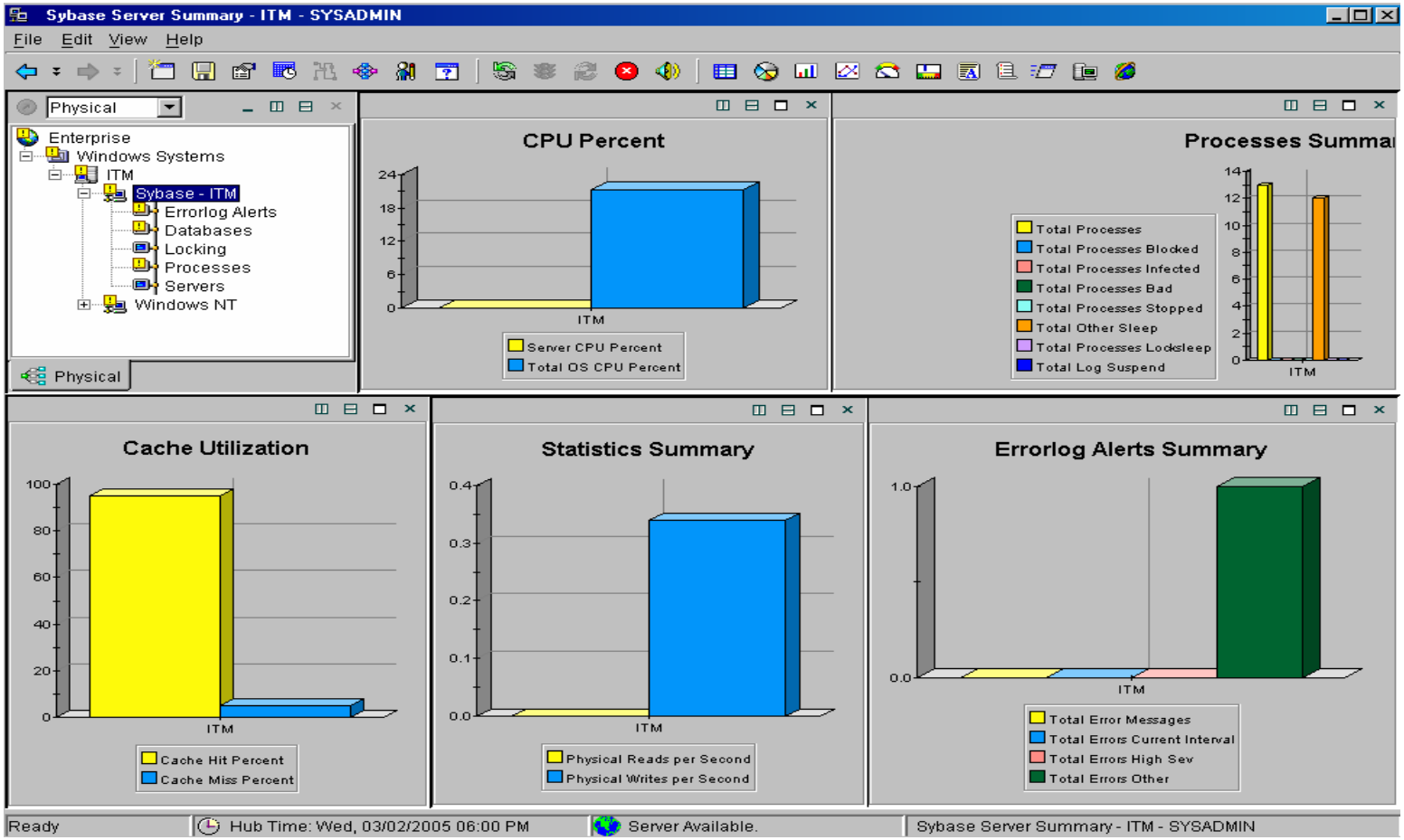
Sybase Overview



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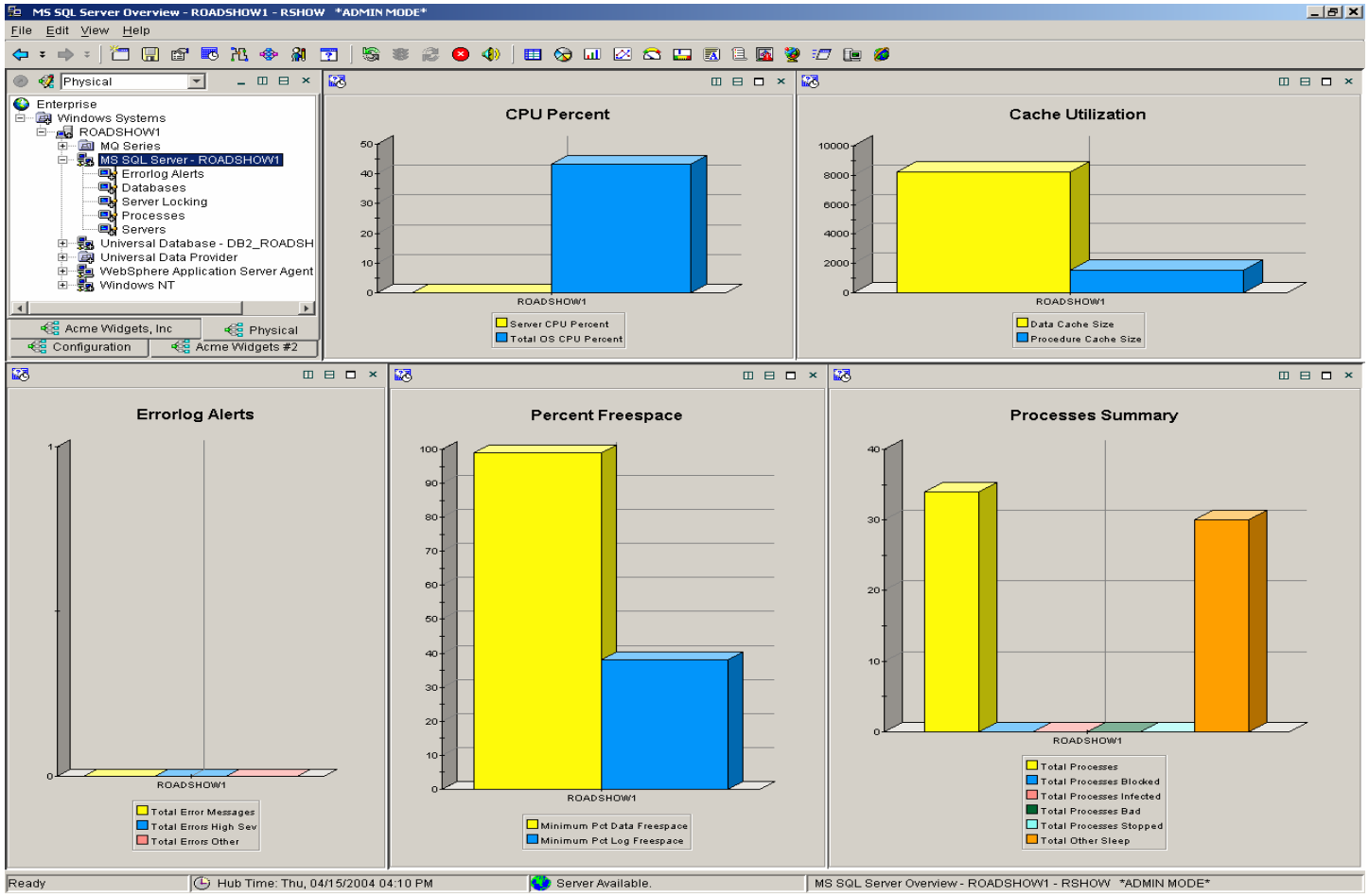
MS SQL Overview



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