Tracking Transactions across Heterogenous Environments

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Who Am I?

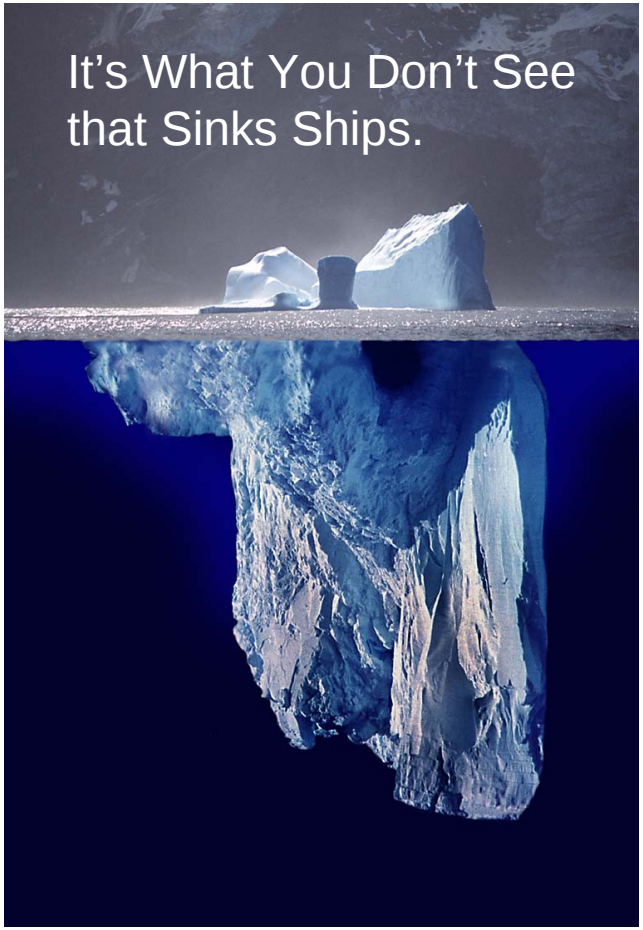
- Barry Lamkin
- Army Helicopter Pilot 1967 – 1971
- Air Traffic Controller 1973 - 1981
- MVS (aka z/OS) Systems Programmer 1981 – 1994
- Candle Systems Engineer 1994 – 2004
- IBM Executive IT Specialist 2004 – whenever

Transaction Tracking - APM

- Transaction Tracking is a major part of Application Performance Monitoring
- To ensure SLA compliance, monitoring transaction performance is essential for finding and fixing problems before they impact customer satisfaction.
- You need a consolidated view for monitoring resources and activities within your enterprise so performance issues can be detected early and resolved quickly.
- When a problem is detected, is it possible to drill-down to diagnose the root cause of the bottleneck so a solution can be implemented?

Businesses are facing unparalleled challenges

- ***Accelerated rate of change*** **drives the need for increased visibility into the application & IT infrastructure**
- ***Monitoring IT resources alone*** **provides an incomplete view of application performance and makes problem isolation and resolution a complex, expensive task**
- ***Lack of visibility*** **into end-user experience, component relationships and service levels in *dynamic environments* such as cloud**
- ***Performance and availability*** **issues for multi-platform composite applications**
- ***Lack of drilldown capability*** **to find the root cause of problems**
- ***Increased risk*** **of revenue loss and brand damage**

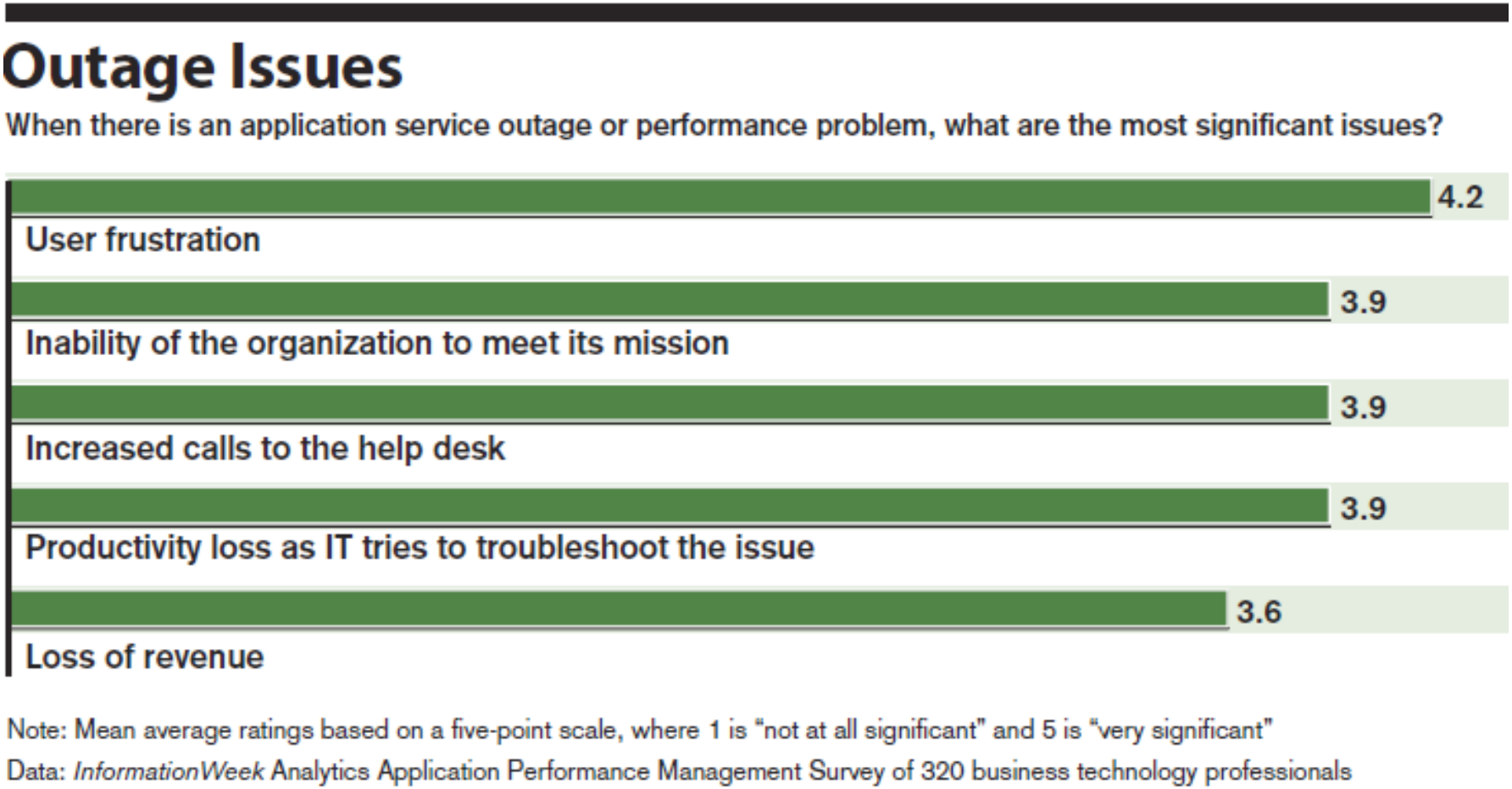


Application Performance Impact

- "It's disturbing that **25%** of the 320 business technology professionals who responded to our *InformationWeek* Analytics APM survey say they **experience application performance problems on a daily or weekly basis**. An additional 28% say issues crop up monthly."
- More than half of respondents rate app services as **critically important**
- 95% say customers and employees have **little to no tolerance for outages**

- **Greater than 80% of survey respondents blamed software** as the main cause of most outages
- **82%** said the application outages and network downtime in the past year were **significant enough to affect their business**
- Respondents reported that the average cost of down time was more than **$10,000 per hour** and downtime itself could last an average of **three to four hours**

Application performance problems cause …



Predictions for 2013 focus on end-to-end requirements

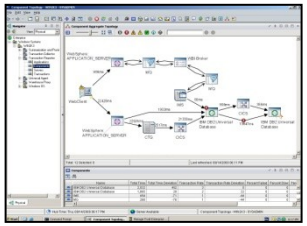
- ***Mainframe*** **and** ***client server*** **based** ***applications sit side by side*** **with workloads running on converged systems and dynamic public and private clouds**
- **Resulting complexity will fuel** ***strong demand for management tools*** **that can effectively** ***span diverse heterogeneous environments***

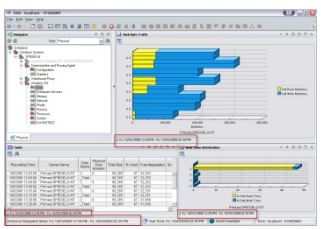
*** IDC's Top 10 System Infrastructure Software Predictions for 2013**

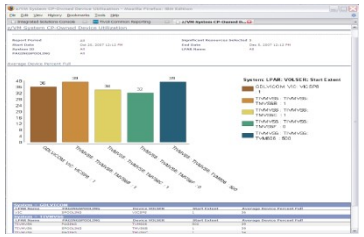
Benefits to Effective Application Performance Management

- Ensure application response meets business expectations
- Understand transaction flows over complex topologies
- Drive close collaboration between departments
- Monitor infrastructure performance and availability
- Diagnose application performance issues
- Increase application availability and customer satisfaction
- Improve MTTR and MTBF

IT Staff

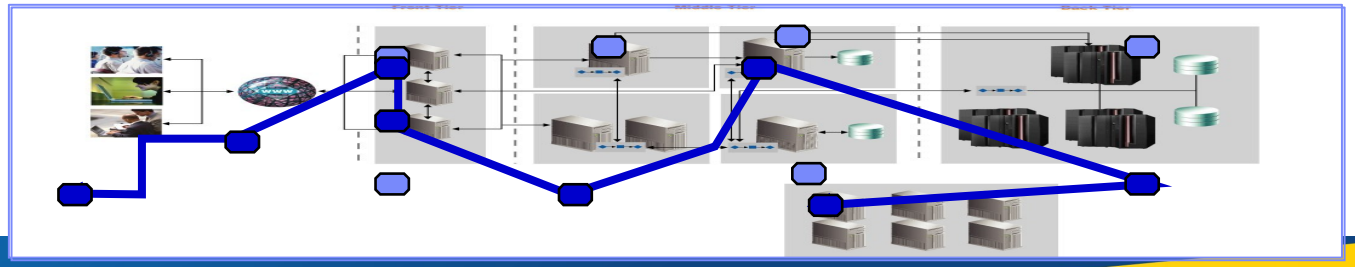






Transactions | **Applications** | **Servers**

IT Customer



The Issue – Sensing and Isolating a Problem Today

Step 1

Response time is terrible; more than 1 minute

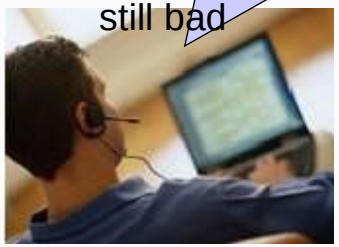
Step 2

Check all resources

- System Alerts
- Health Monitors
- OS Statistics
- Network traffic
- Application log files
- Database metrics

Step 3

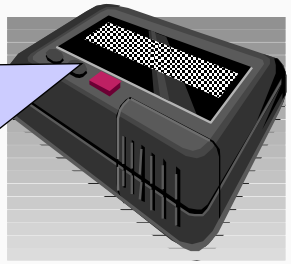
Everything looks normal … but performance is still bad



Step 4

Bridge Call with Tiger Team

Involves IT Ops, Web admin, network admin, server admin, etc. when only one will be responsible for failing component



Step 5

Locate Source of Problem … maybe …

- Finger-pointing: "It's the network guy's fault"
- Recreating problem is difficult
- Isolating cause can take hours or days
- Solutions by chance

Customer Value – Demonstrating ROI

Money wasted isolating problems

Sev 1 outages/slowdowns per year	12
Average time to isolate (hrs)	8
SME's involved in isolation	15
Avg. loaded hourly rate (/hr)	$75
Total direct costs	$108,000

Revenue lost during outages

Lost revenue per hour	$50,000
Hours downtime / yr	96
Total indirect costs	$4,800,000

Total costs of poor problem isolation capability

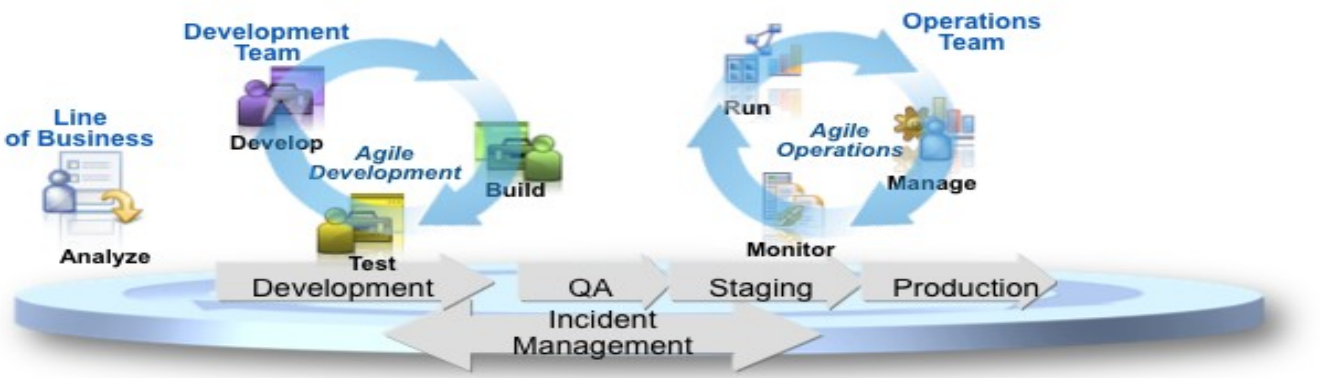
Total lost / yr	**$4,908,000**

Every customer case will be different …

*…what do **you** lose each year due to poor performance?*

Application Performance Management provides…

Visibility, control and automation to intelligently manage critical applications in cloud and hybrid environments.



Discovery
Visibility into application resources

End User Experience
Transaction performance monitoring to ensure SLA compliance

Transaction Tracking
Rapid problem isolation through transaction path analysis

Diagnostics
Domain-specific operations tools for diagnosis and repair

Predictive Analytics
Proactive Management to reduce outages & improve business performance

shared data & common services

Understand the end-user experience

Follow changing workloads

See steps across the cloud

Application Performance Management Workflow

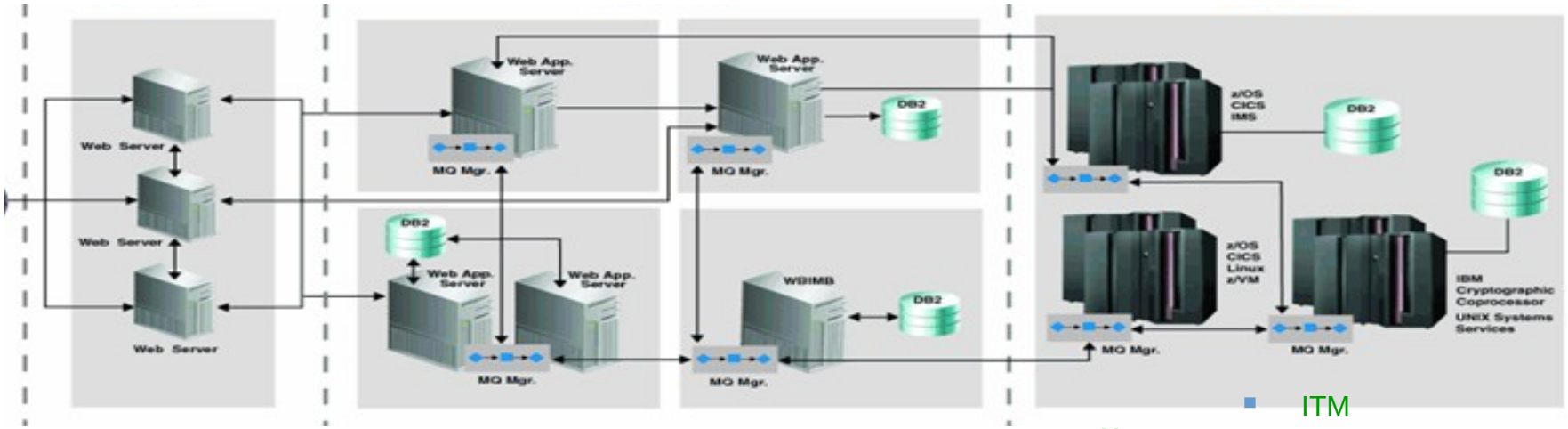
Sense → **Isolate** → **Diagnose** → **Repair**

Detect that a threshold has been breached and that a problem occurred, or is about to happen

Pinpoint the problem to a specific part of the environment and hand-off to the appropriate specialist

Drill down into the details and get to the root cause of the problem

Fix the faulty component, validate the fix and roll back into production

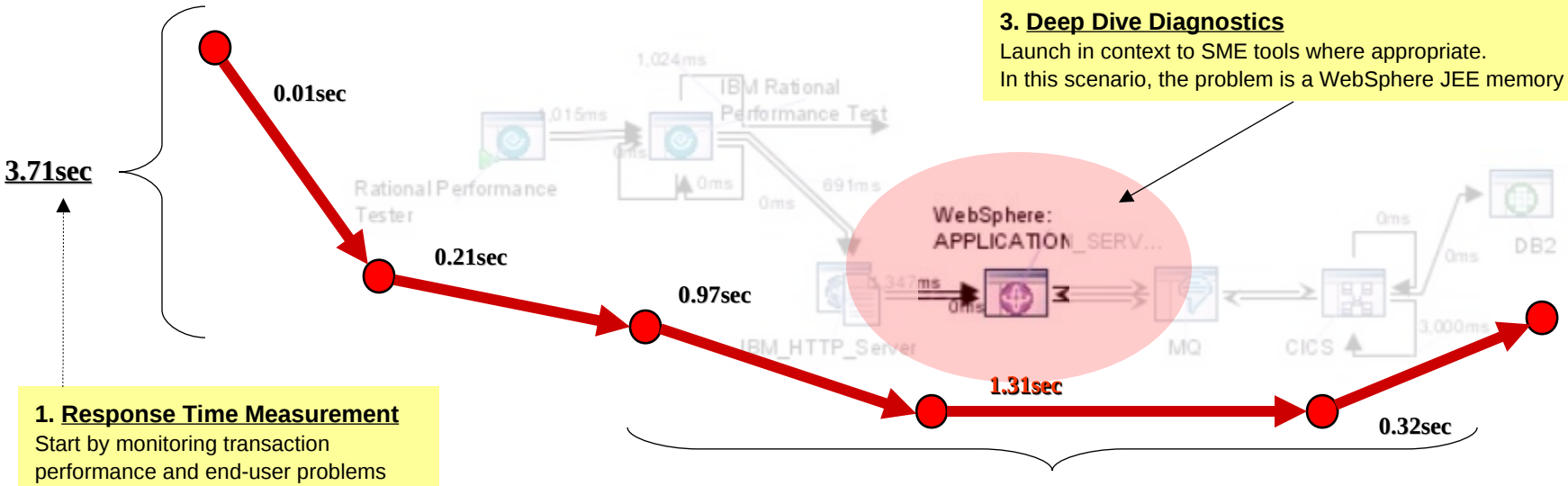


Transaction Tracking

Deep-dive tools

- ITM
- ITCAM for AD
- ITCAM for SOA
- OMEGAMONs

End-to-End Monitoring, Tracking and Diagnosis



3. Deep Dive Diagnostics
Launch in context to SME tools where appropriate.
In this scenario, the problem is a WebSphere JEE memory leak.

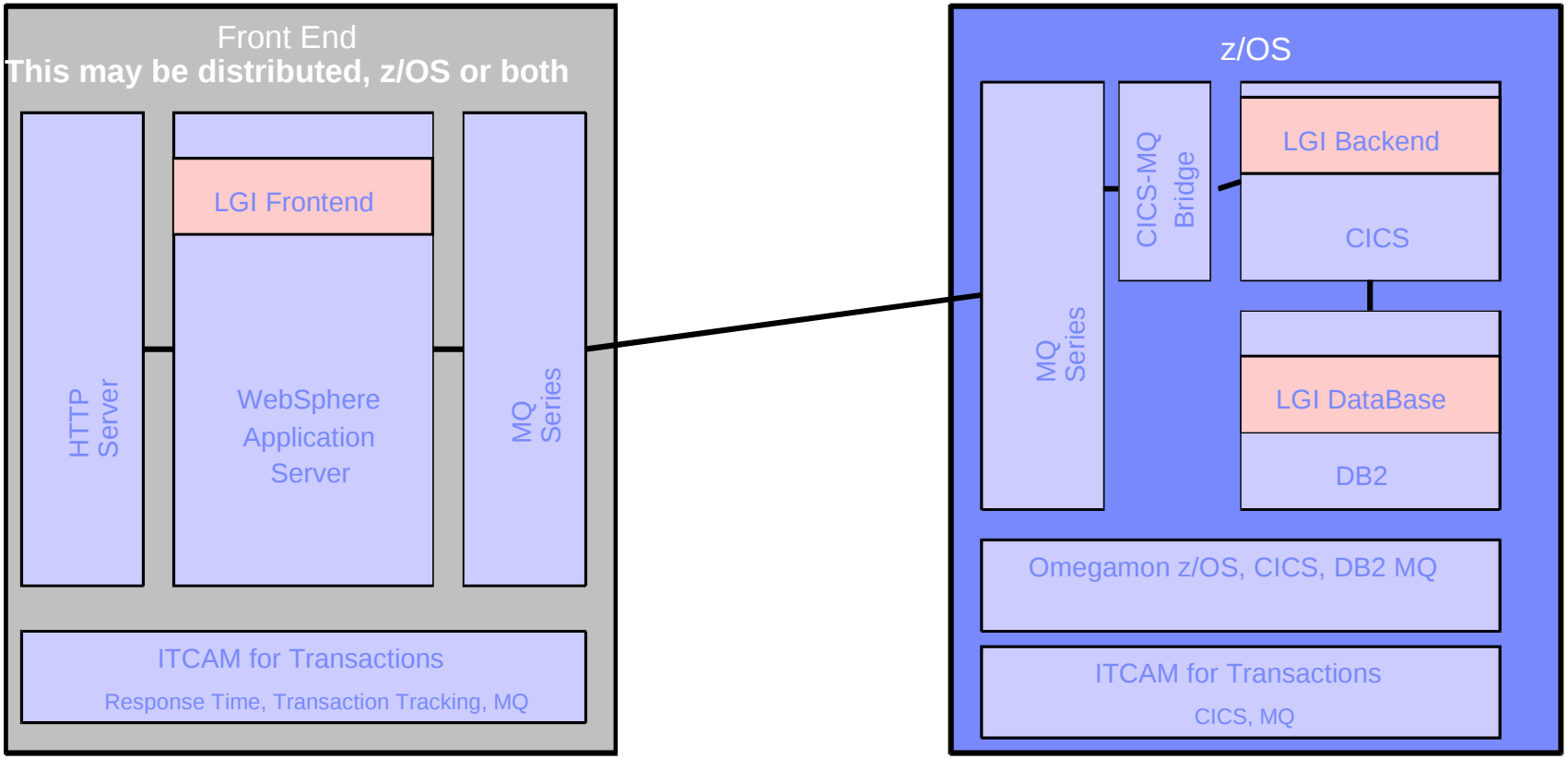
1. Response Time Measurement
Start by monitoring transaction performance and end-user problems

2. Transaction Tracking
Correlate data from app server, MQ, CICS, IMS, custom instrumentation, etc. to show topology and isolate problems

Transaction Root Cause Analysis

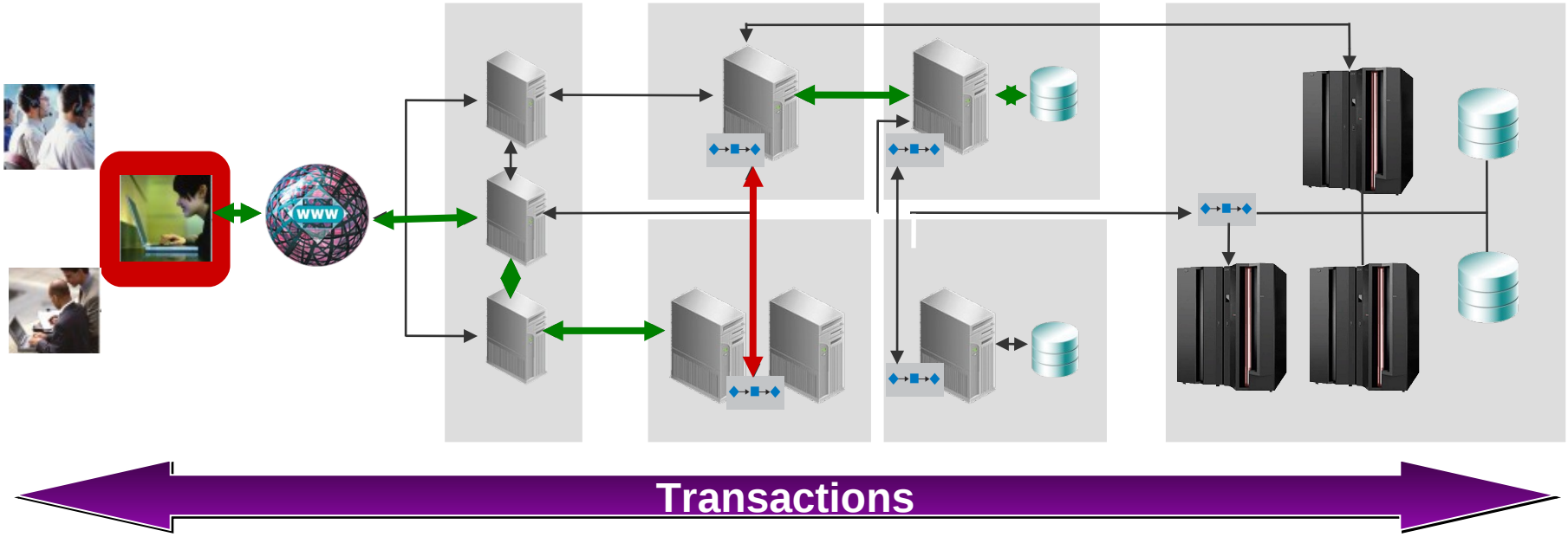
1. **Sense** End User Experience and alert on threshold violation	1. **Isolate** by measuring performance data against baseline through entire infrastructure	1. **Diagnose and repair** through launch-in-context into deep-dive diagnostics

End-to-End infrastructure - System z backend



The front-end may be either zLinux, distributed or native z/OS or a mix: customers may deploy any of these configurations.

Why Monitor End-User Response?



- See what your users are experiencing
- Validate production system performance
- Identify problems before they affect SLA's
- **If you have a problem, find out about it *before* the customers start complaining**

A majority of IT problems are still being **identified by customer complaints**

End User Monitoring

Ensure end user's experience always meets their expectations

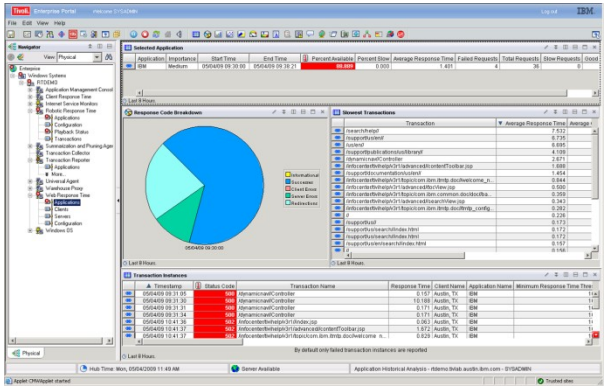
- **See what your users are experiencing**
- **Identify problems before they affect** SLAs:
  - Real-User monitoring
  - Robotics monitoring
- **Continuously validate** production system performance
  - Captures performance and availability data of actual users for SLA reporting
- Monitors network traffic for HTTP(S) requests to the web server
  - Completely non-invasive, agentless monitoring
- **If you have a problem, find out** about it ***before*** the **customers complain**

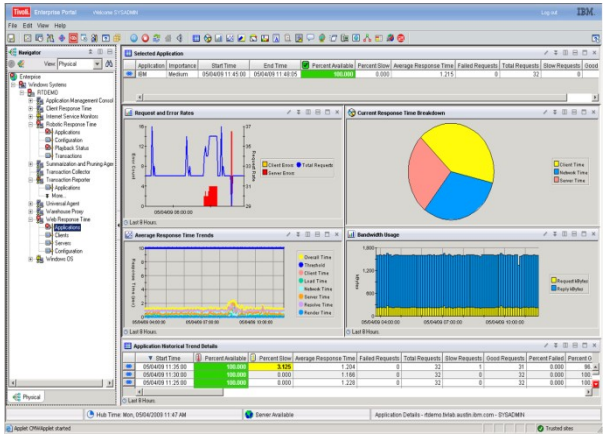
50% of problems found through customer complaints to help desk!

Two Techniques for Response Time Monitoring

Real End User Transactions

- **Web Response Time Monitoring**
  - Monitors actual customer experience
  - Agentless solution
- **Client Response Time Monitoring**
  - Monitors real-user client desktop applications
  - Detailed response measurement for VIP customers





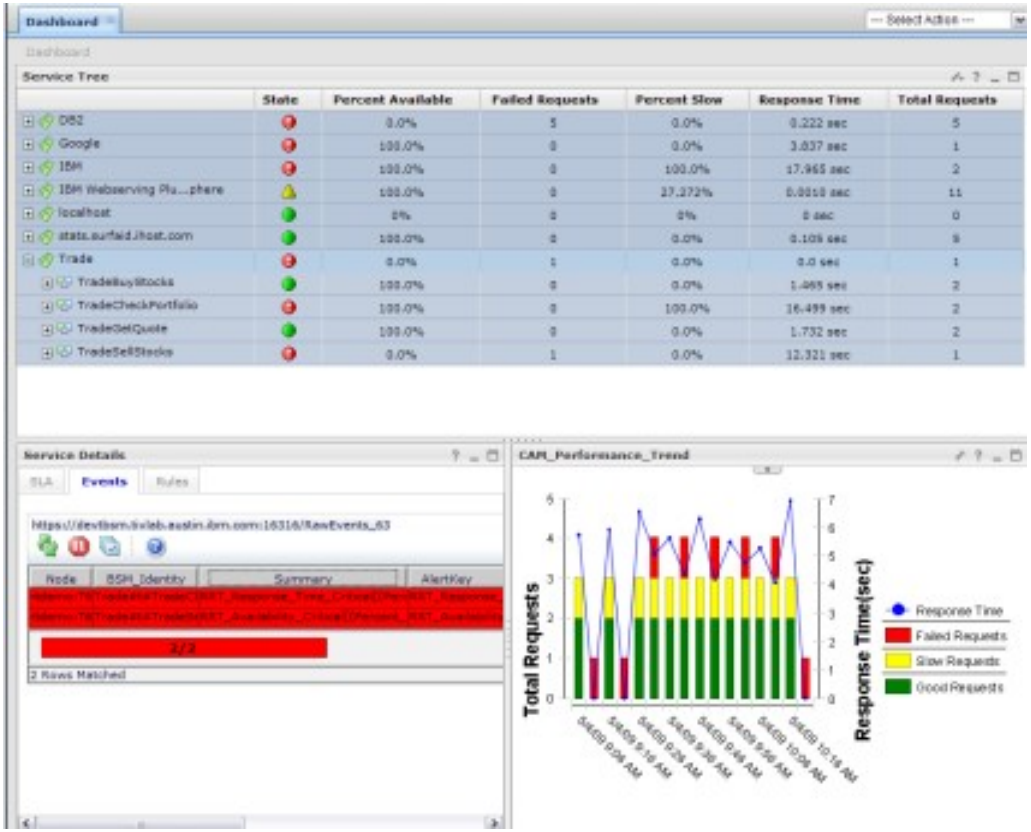
Robotic Transactions

- **Robotic Response Time Monitoring**
  - Repeatable testing of high-priority transactions
  - Early warning of failures or performance problems
- **Internet Service Monitoring**
  - Periodic testing of services that make systems run
  - Simple and lightweight

Agentless Real-User (Passive) Monitoring

Monitor <u>every</u> end user's experience

- See what your users are experiencing and immediately identify problems
- Agentless – no impact to production machines
- User/session tracking – observe individual user experience
- Multi-protocol support (beyond HTTP/S)



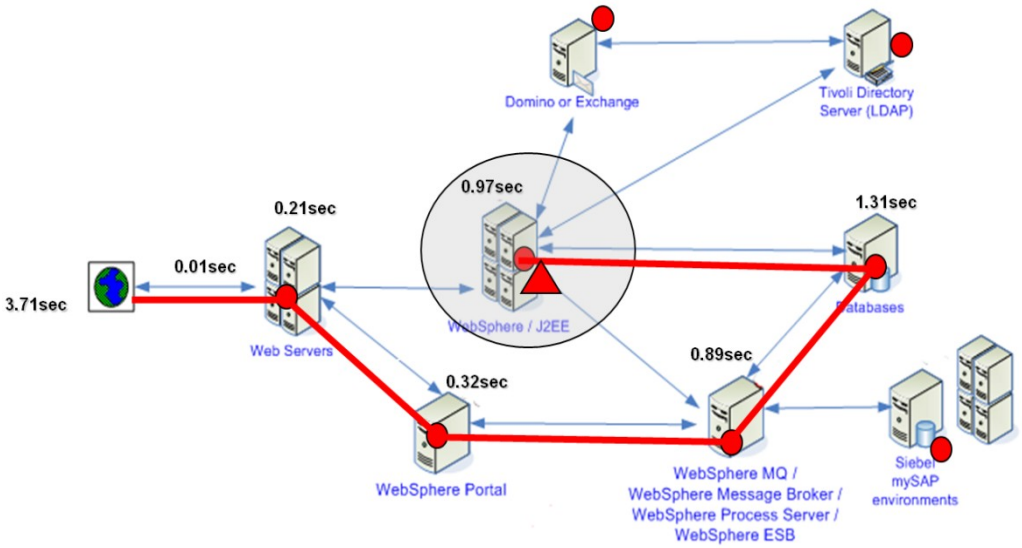
Robotic Monitoring

- **Verification Points for content matching and response code checking**
- **HTTP transactions correlate with downstream instrumentation for problem isolation**
- **Improved scalability for more concurrent playbacks on a single agent**
- **Support for a growing list of protocols: HTTP(S), Siebel, Citrix, web services**

Transaction Tracking

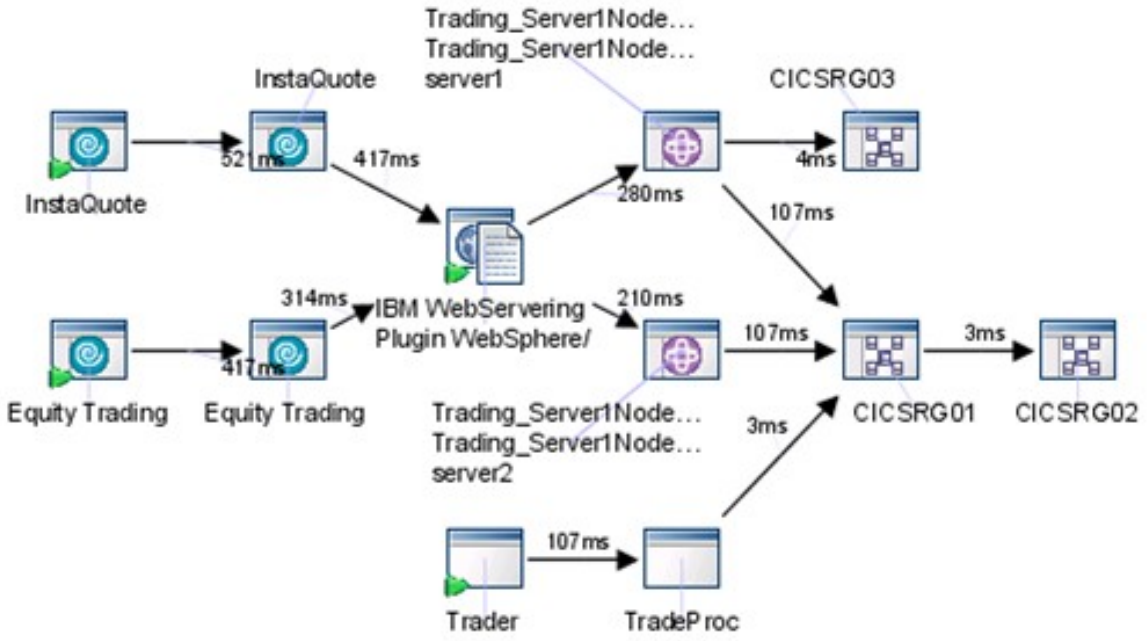
Quickly isolate the failing component in the application

- Follow path of user transactions across application infrastructure domains, making it easier to evaluate a transaction in its entirety
  - Agentless: Track flows through network traffic
  - Agent Based: Detailed, Instance-level Transaction Tracking
- Visibility into how IT infrastructure delivers business critical applications
- End-to-End view of response times across multiple domains helps quickly isolate problems and hand problem off to appropriate specialist



Problem Isolation Through Transaction Tracking

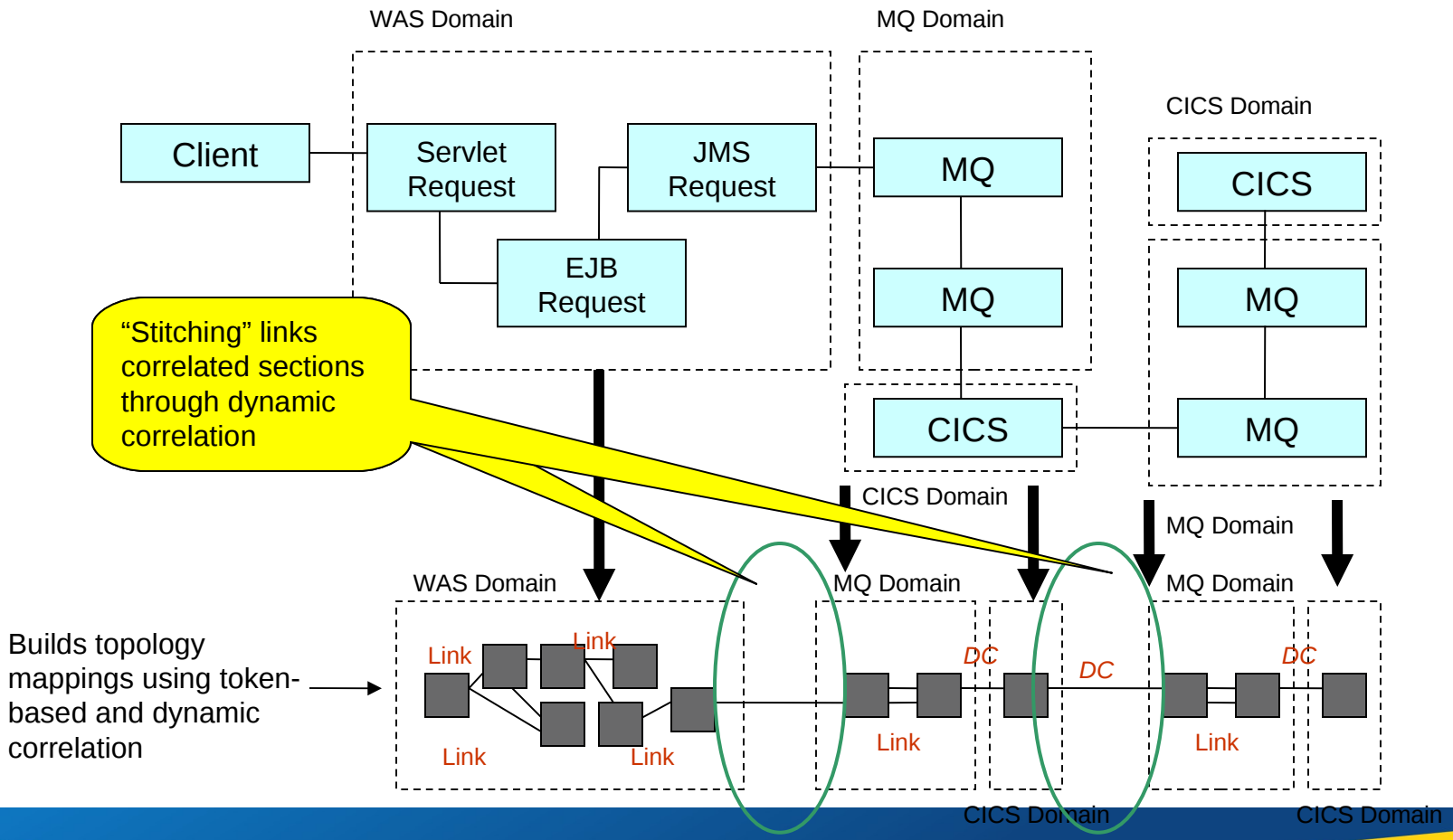
- **Unified, end-to-end transaction tracking**
- **Heterogeneous environments**
  - fully integrated across distributed and System z



- Support for asynchronous transactions
- Extensible, modular framework
- Integrated response time and transaction tracking

Enterprise-Wide Tracking

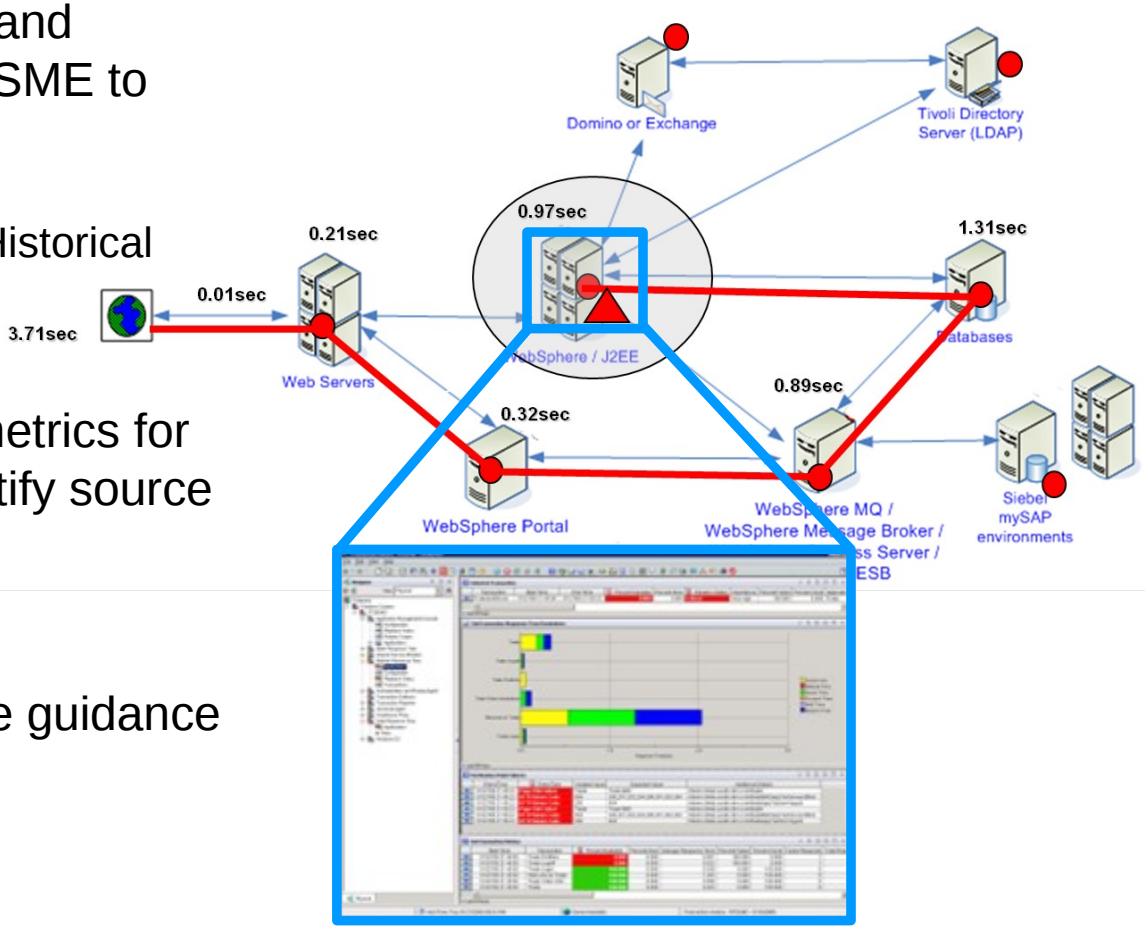
- **Track inside domains with correlated techniques**
- **Track between domains through stitching**



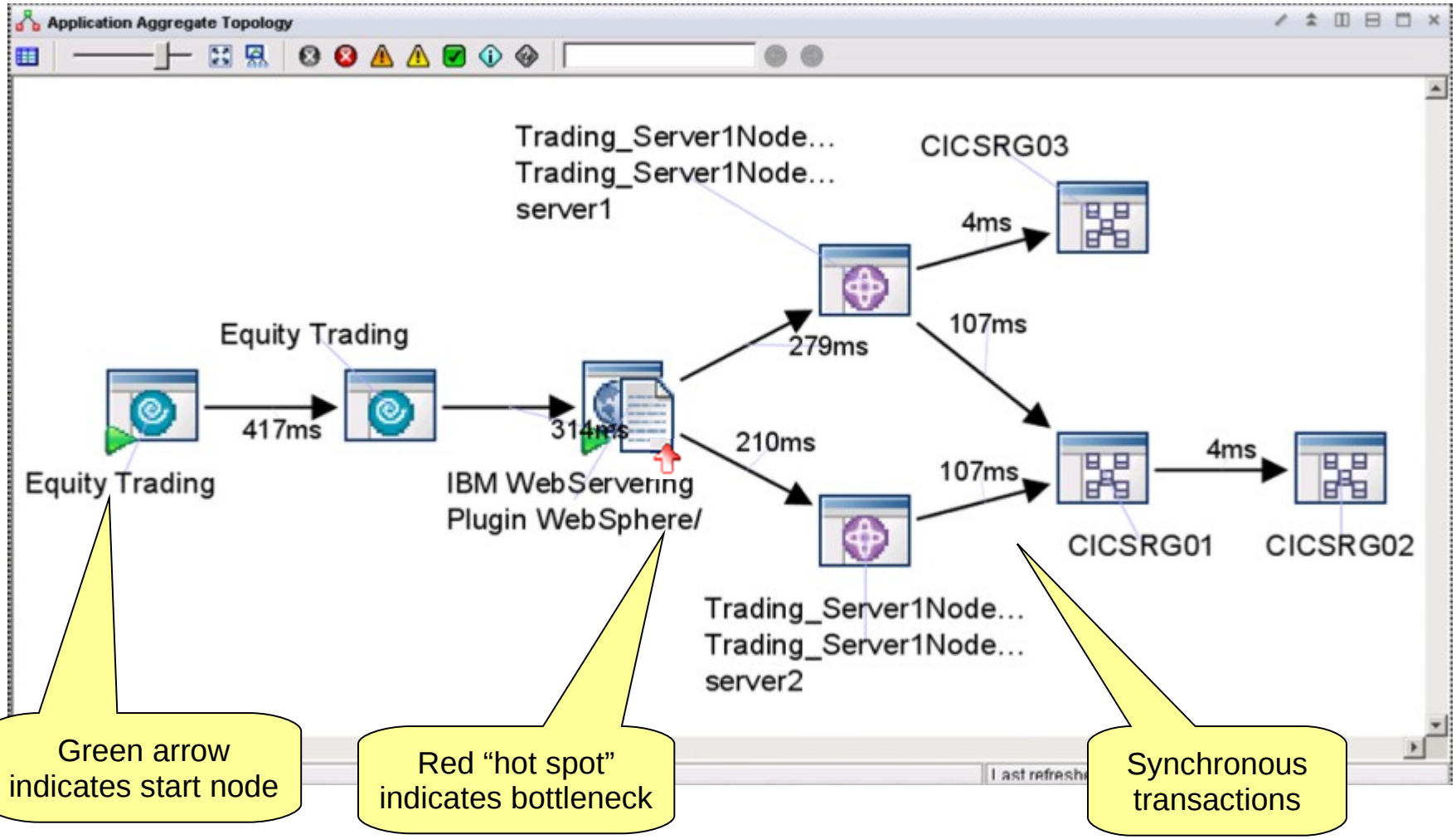
Diagnostics

Quickly identify the source of the failure within the component

- When the failing component has been isolated, detailed performance and availability metrics provided to SME to troubleshoot
  - Access to both Real-time and Historical data within a single UI
- Access to key performance metrics for each resource to quickly identify source of failure
- Expert Help and Best Practice guidance for optimum performance

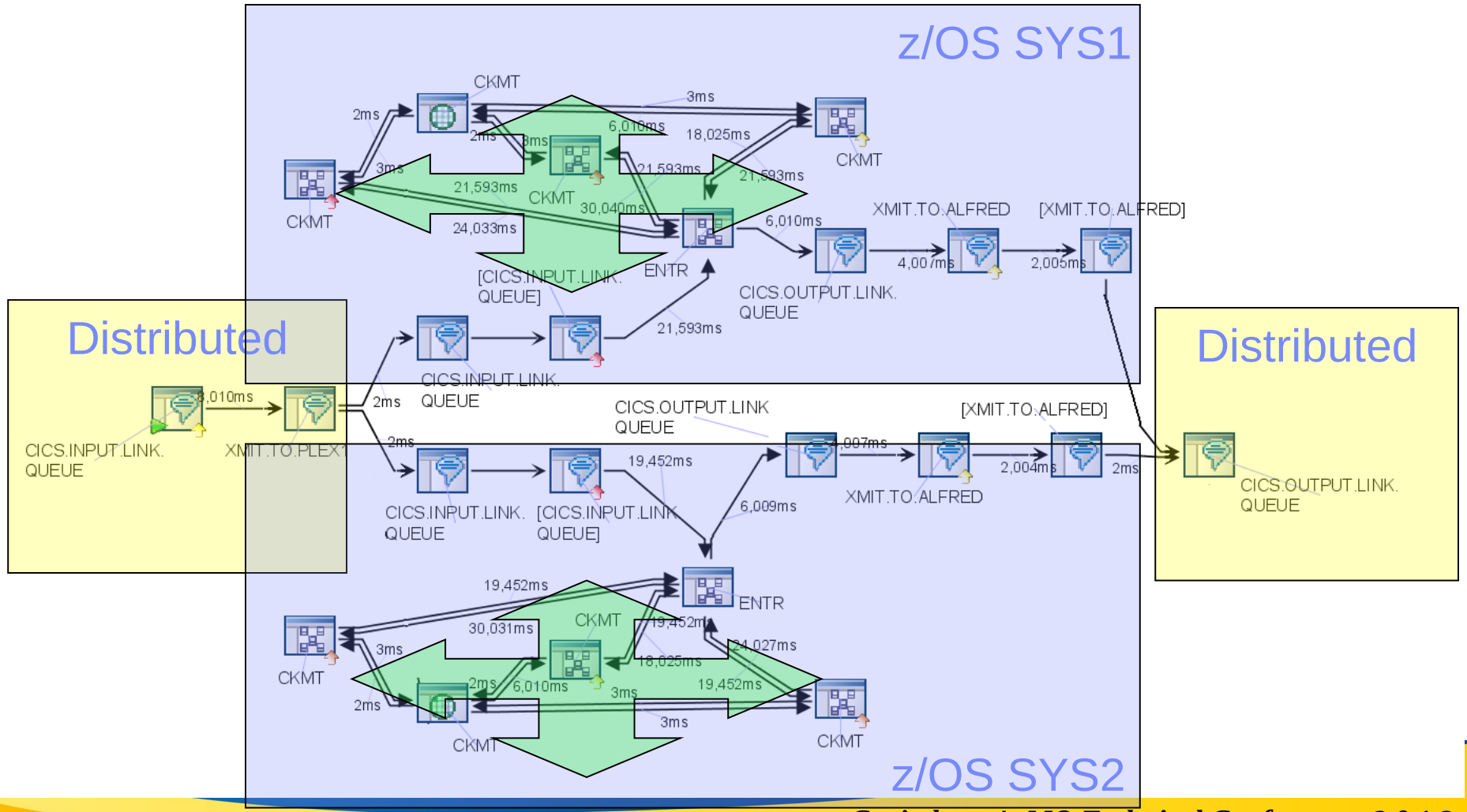


Transaction Tracking Topology



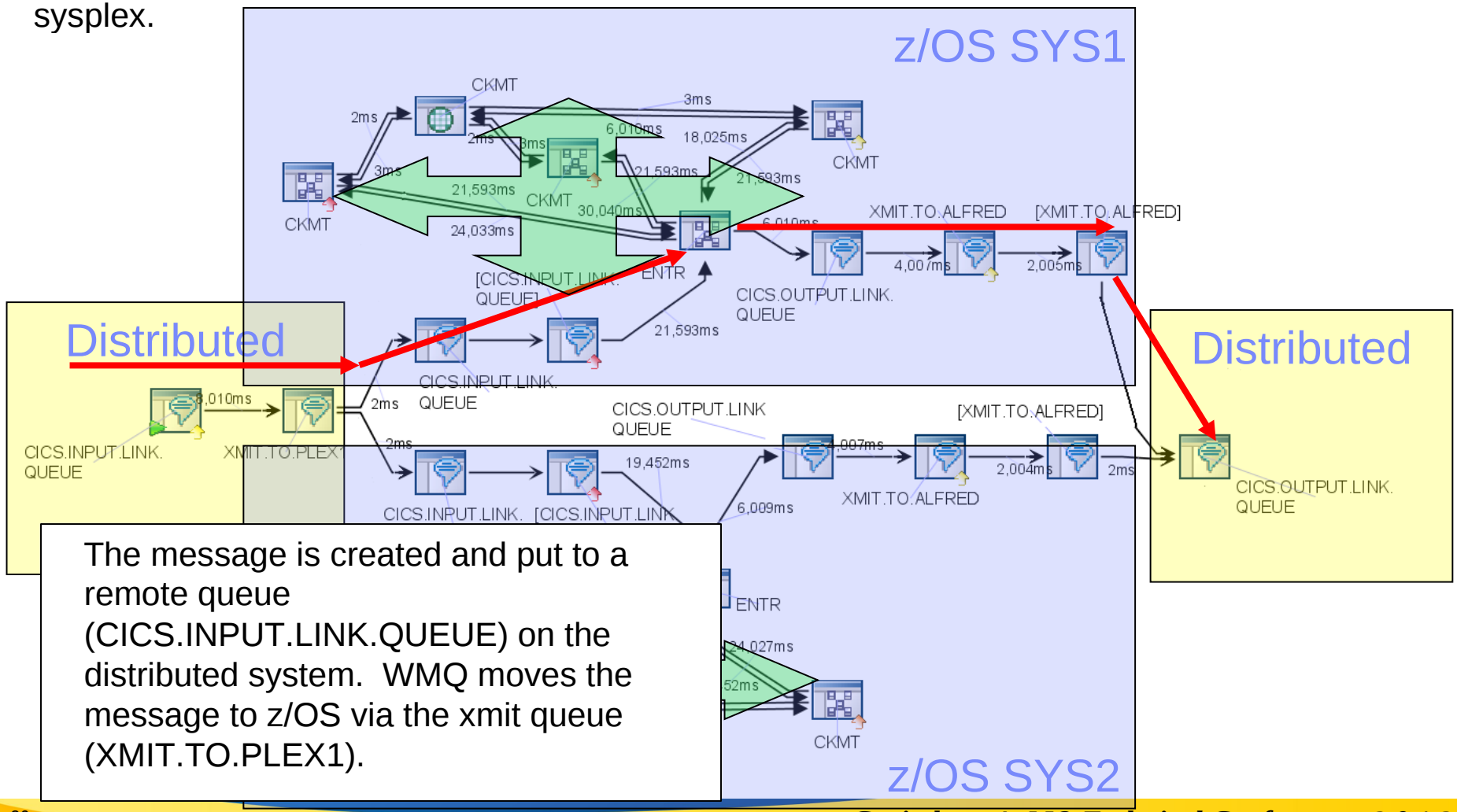
4-Way Sysplex WMQ → CICS → DB2

- Here is an example of a 4-way sysplex with distributed systems connected to z/OS using WMQ. For simplicity we are only showing 2 systems from a 4-way sysplex.



4-Way Sysplex WMQ → CICS → DB2

- The distributed application drives CICS and DB2 on the host. The red arrow shows the path of a WMQ message originating on a distributed system and flowing through to the z/OS sysplex.

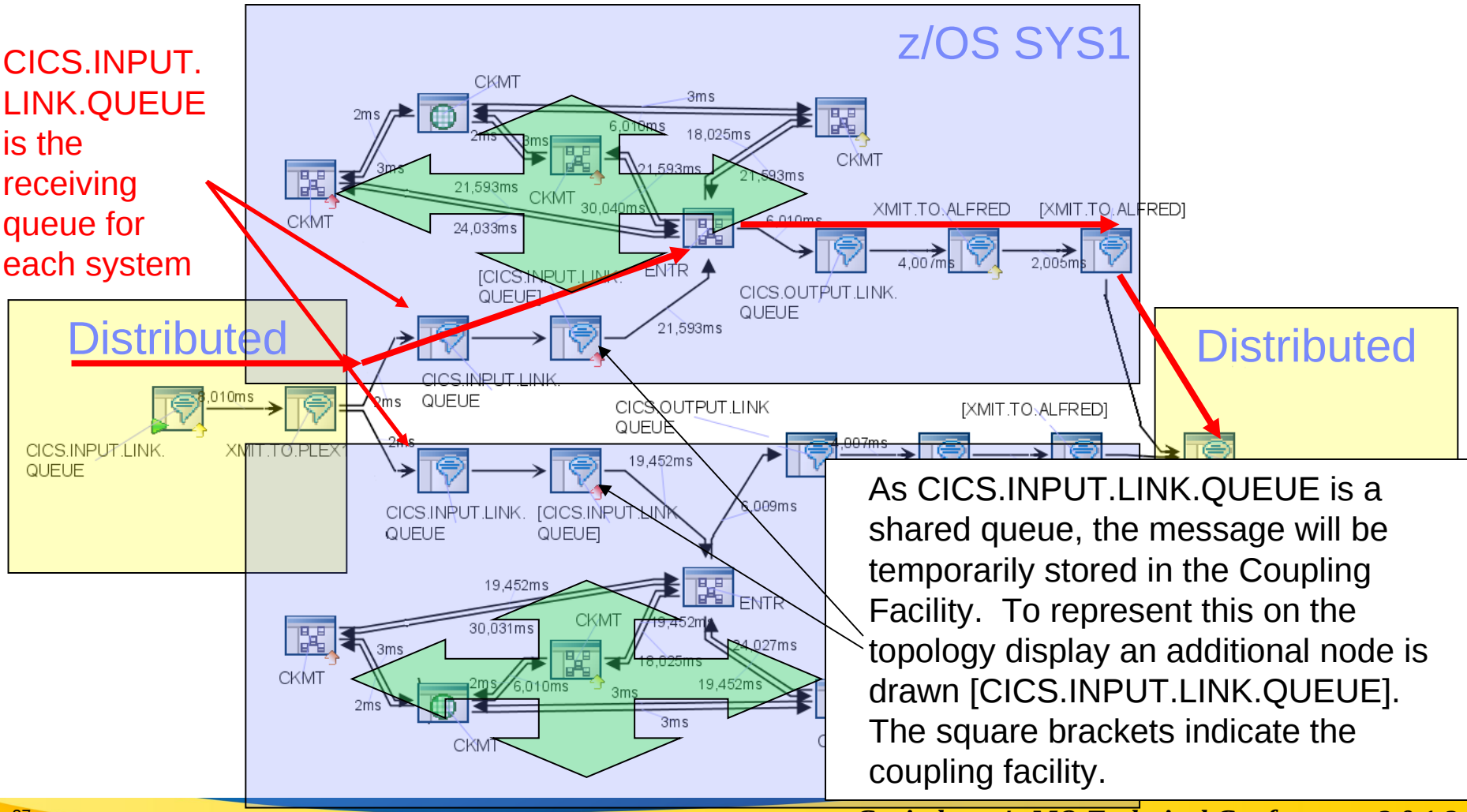


The message is created and put to a remote queue (CICS.INPUT.LINK.QUEUE) on the distributed system. WMQ moves the message to z/OS via the xmit queue (XMIT.TO.PLEX1).

4-Way Sysplex WMQ → CICS → DB2

- The z/OS system has a shared queue configuration so the message may be directed to any of the 4 systems in the sysplex. In our example, a message is transferred to system SYS1.

CICS.INPUT.LINK.QUEUE is the receiving queue for each system

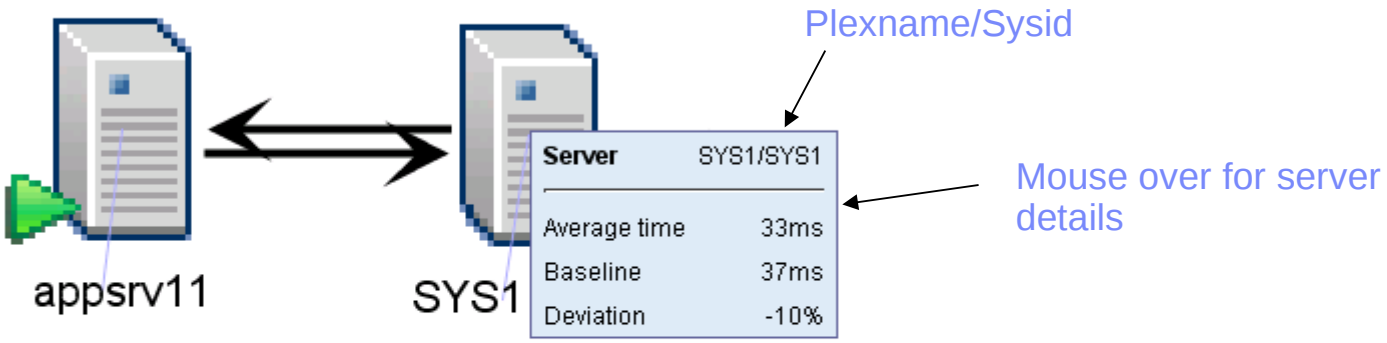


As CICS.INPUT.LINK.QUEUE is a shared queue, the message will be temporarily stored in the Coupling Facility. To represent this on the topology display an additional node is drawn [CICS.INPUT.LINK.QUEUE]. The square brackets indicate the coupling facility.

Transaction Tracking – Topology Workspace Views

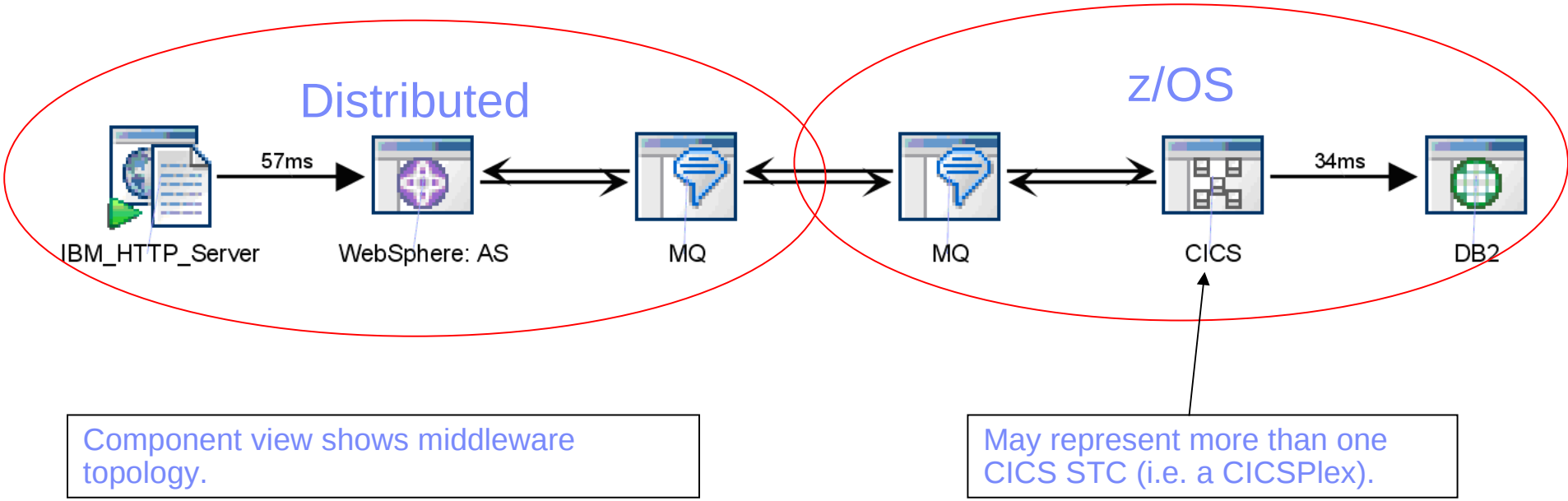
- There are 4 topology workspace views available in the TEP.
  - Server:
    - A topology showing monitored servers (Sysplex name/SMFID or shortname).
  - Component
    - A topology showing the monitored components (Eg: WAS, CTG, CICS, IMS, Connect IMS, WMQ).
  - Application:
    - A topology showing monitored applications (jobnames, STC names, subsystem names).
  - Transactions
    - A topology showing the monitored transactions (Eg: CICS transaction name, IMS transaction name, WAS jsp).

Server topology



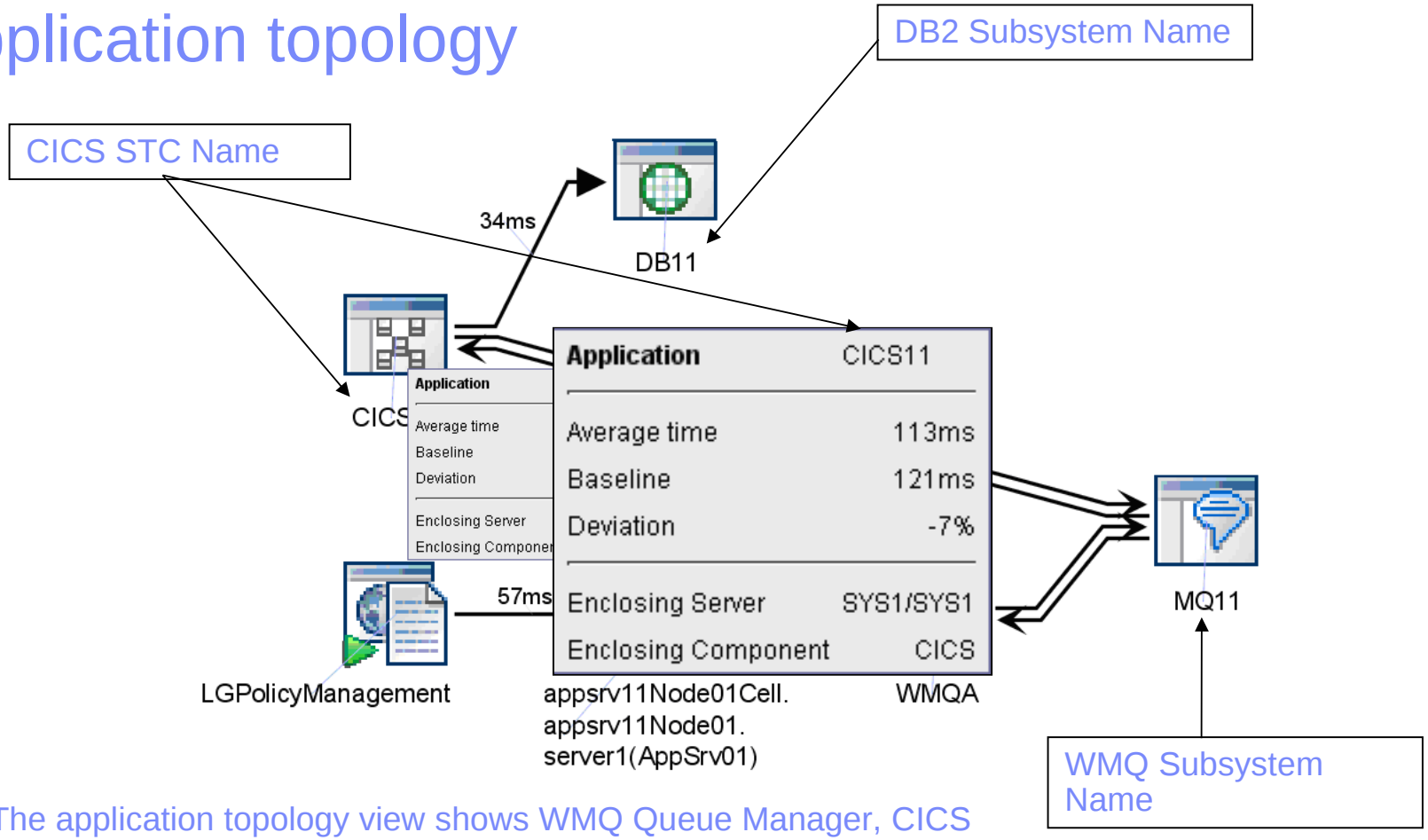
Simple server topology shows single distributed server interacting with a single z/OS server.

Component topology



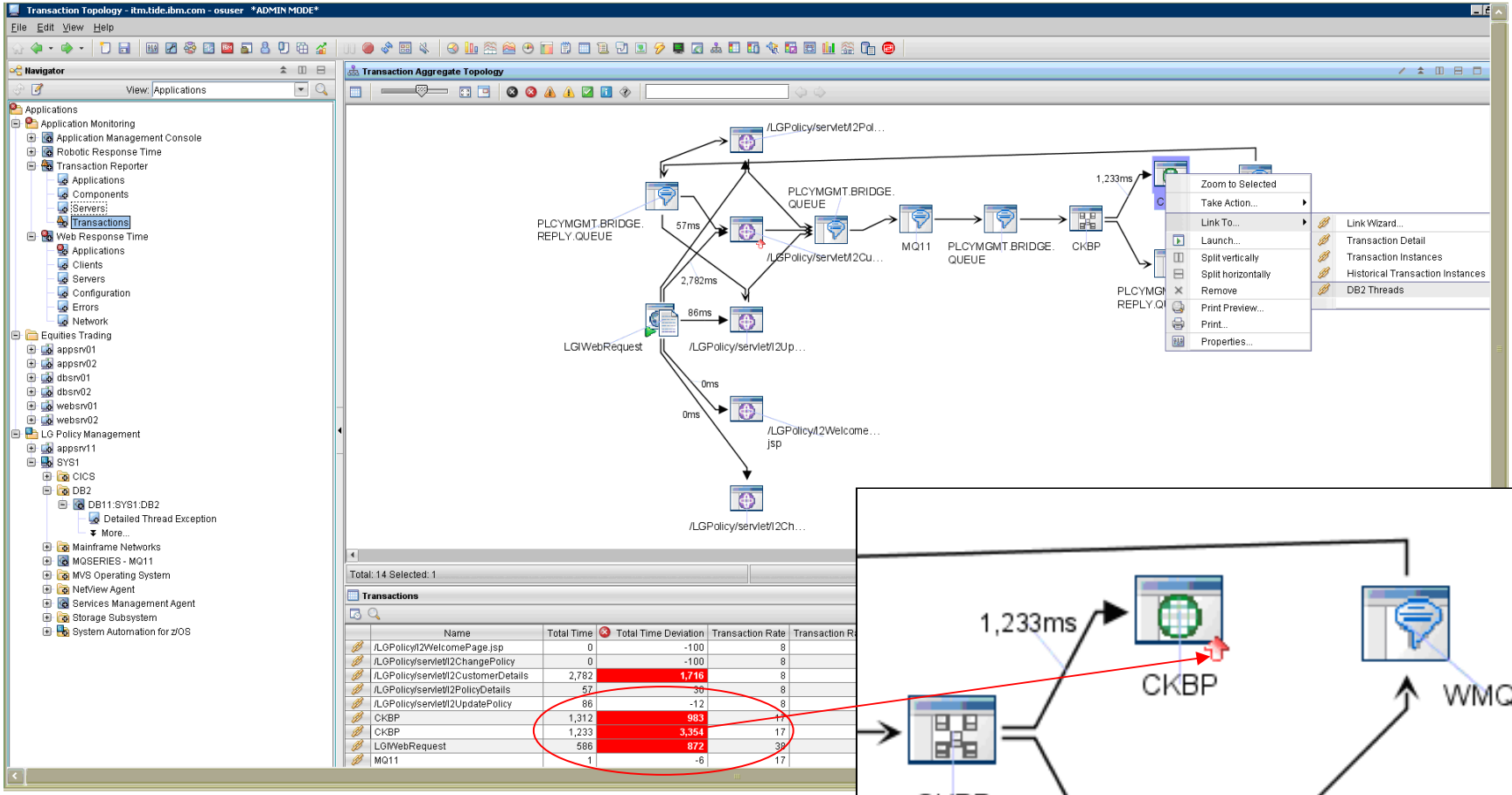
Component view provides more insight into the deployment.
On z/OS, WMQ into CICS (via the bridge) with a typical CICS to DB2 backend.
A z/OS monoplex was chosen for simplicity.

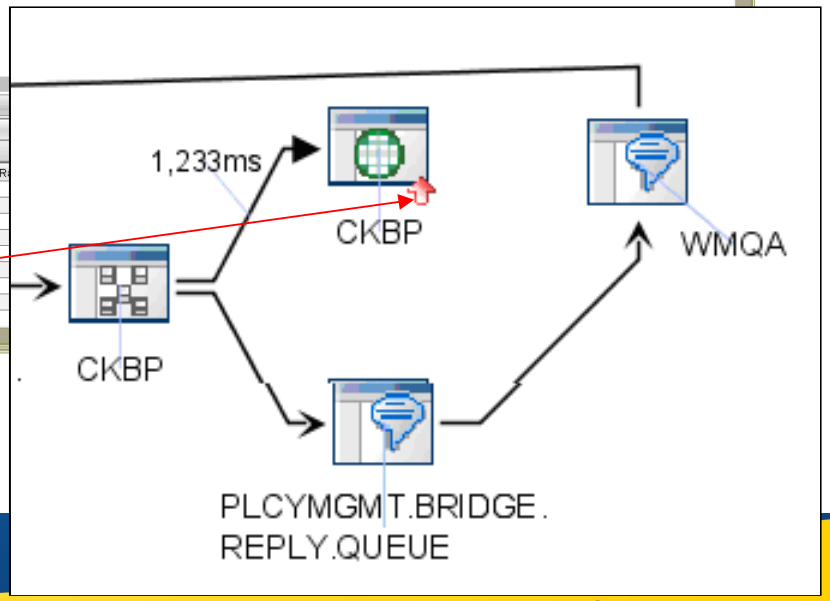
Application topology



The application topology view shows WMQ Queue Manager, CICS STC, and the DB2 subsystem.
Mouse over shows z/OS host system and response time details.
In a sysplex (shown later) we can use this view to locate a specific WMQ/CICS/DB2 on the associated sysplex member.

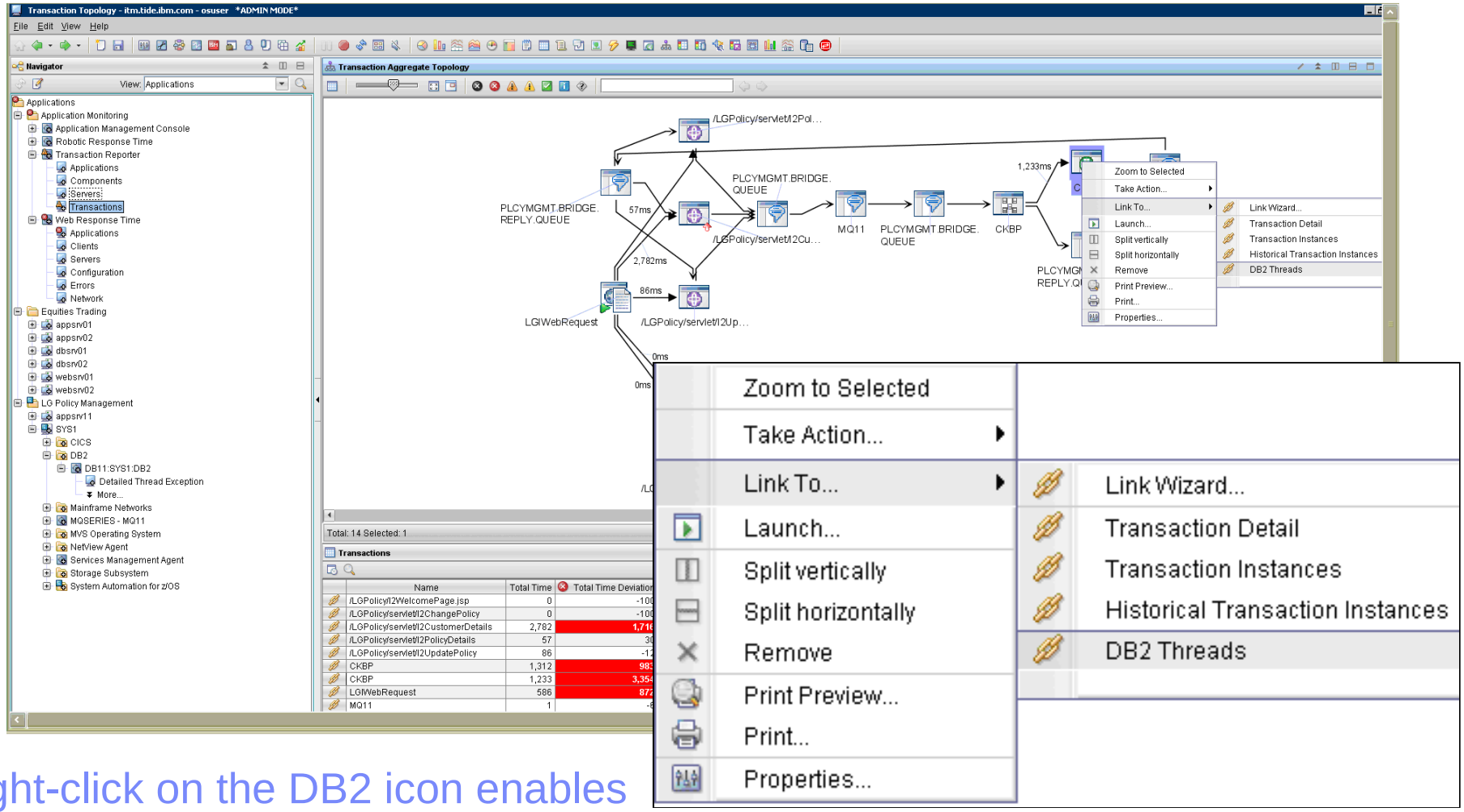
Transaction topology





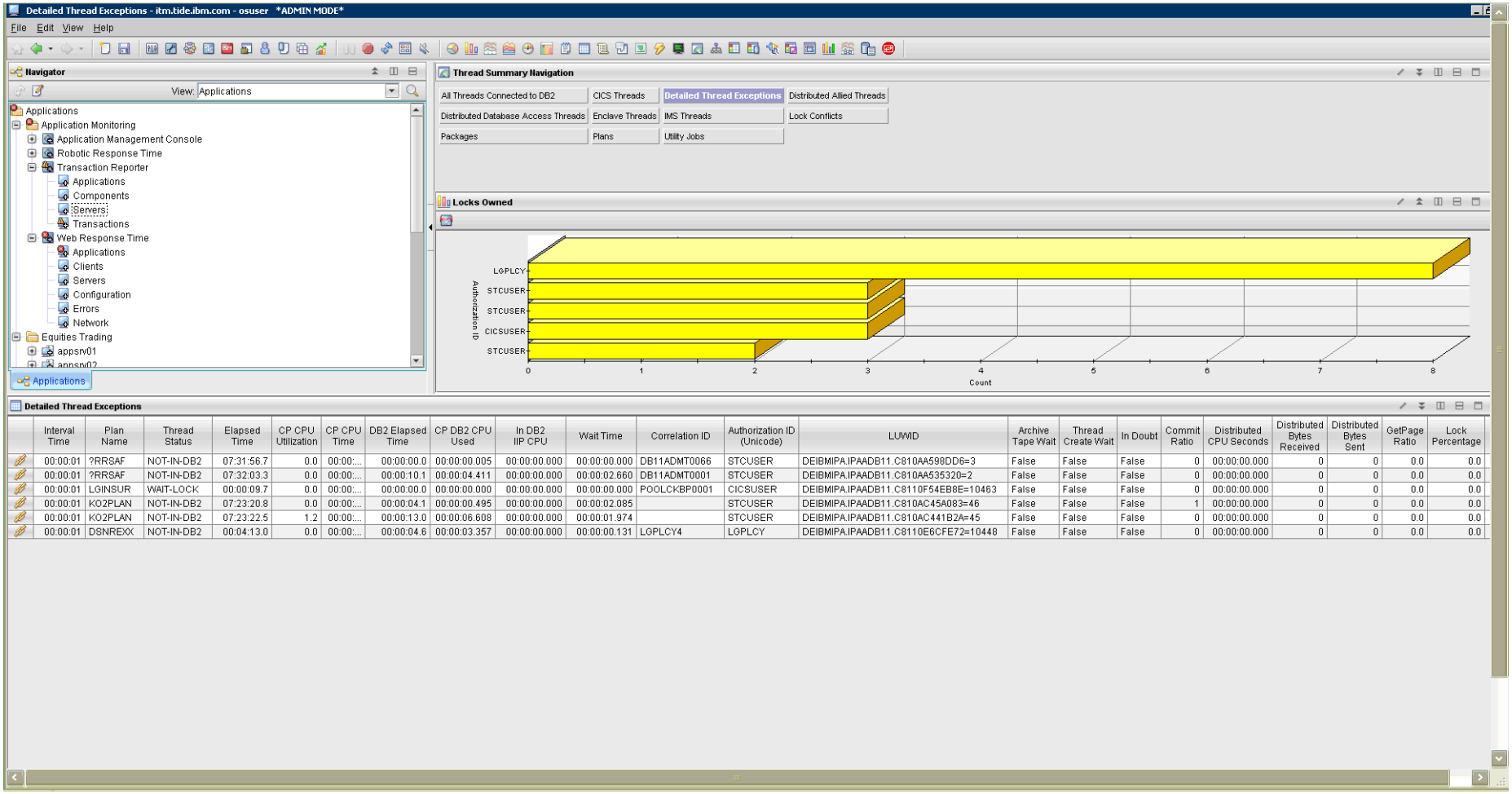
Red arrow indicates a response time deviation above 100%.
The high-lighted icon indicates a problem with DB2 associated with the CICS transaction CKBP

Transaction topology – Launch to Omegamon for DB2



Right-click on the DB2 icon enables launch to Omegamon for DB2

Omegamon for DB2



	Interval Time	Plan Name	Thread Status	Elapsed Time	CP CPU Utilization	CP CPU Time	DB2 Elapsed Time	CP DB2 CPU Used	In DB2 IIP CPU	Wait Time	Correlation ID	Authorization ID (Unicode)	LUWID	Archive Tape Wait	Thread Create Wait	In Doubt	Commit Ratio	Distributed CPU Seconds	Distributed Bytes Received	Distributed Bytes Sent	GetPage Ratio	Lock Percentage
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	00:00:01	?RRSAF	NOT-IN-DB2	07:32:03.3	0.0	00:00:...	00:00:10.1	00:00:04.411	00:00:00.000	00:00:02.660	DB11ADMT0001	STCUSER	DEIBMIPA.IPAADB11.C810AA535320=2	False	False	False	0	00:00:00.000	0	0	0.0	0.0
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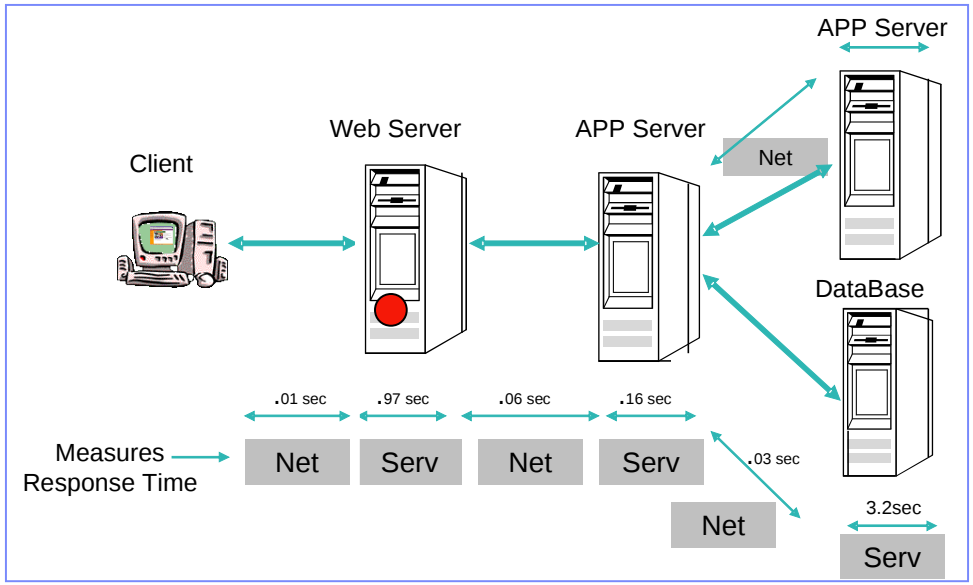
Transaction Tracking

Focused on simplicity and integration

Response Time Measurement

Monitors transaction performance and identifies end-user problems



Transaction Tracking

Consumes data from app server, MQ, CICS, IMS and custom instrumentation to show topology and isolate problems

Deep dive Analysis

Supports launch in context to SME capabilities including SME level tracking

Summary

- End User Monitoring is critical
  - Real User Monitoring
  - Synthetic Transaction Monitoring
- Transaction Tracking in today's complex environments is critical
- Performance needs to include all platforms/systems
  - Leads to closer collaboration between departments
- Standardize on tooling on each platform
- Standardize on metrics provided & measured where possible
- Standardize on a single pane of glass application view
- Standardize on dashboard design
- Applications should not go into production without adequate monitoring

Questions & Answers