



Tivoli Software

How to optimize performance and availability across IT

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Paper 8817

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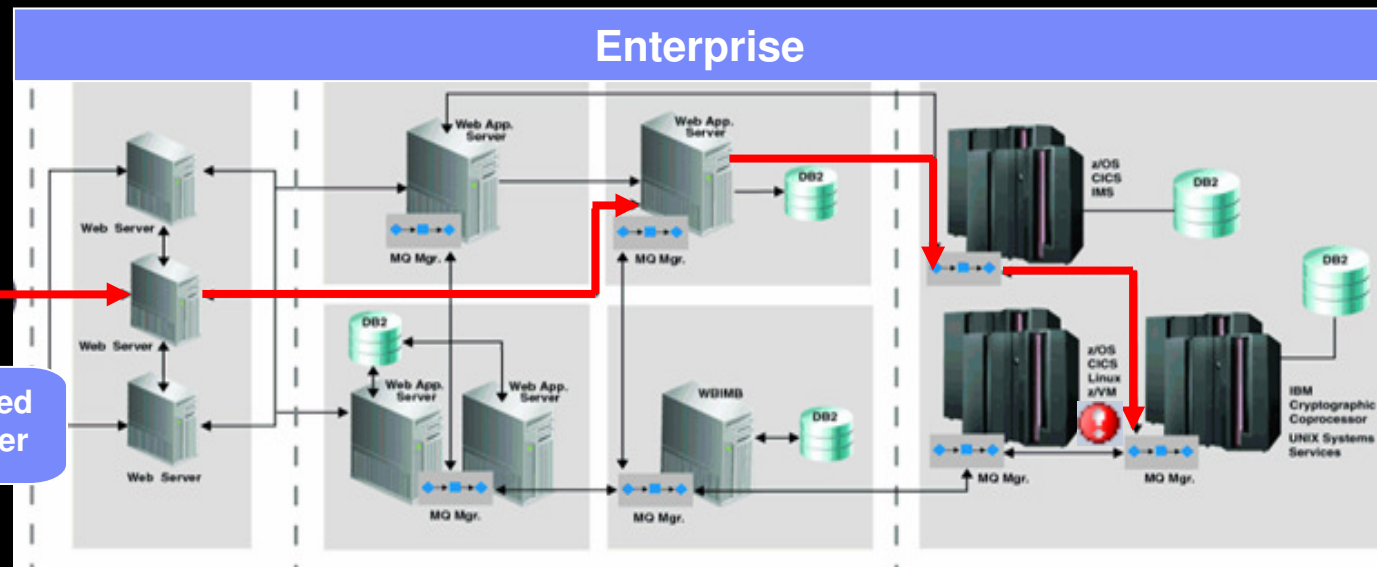
Why do we care?

Majority of IT problems are still being identified by customer complaints

- We support, host & manage complex distributed business applications
- Our customers demand 100% application availability & high performance
 - Unsatisfied customers translate into lack of revenue
- We have limited IT budget and resources
- We can't optimize everything
- We need to focus on what impacts our customers



Frustrated Customer



Transactions

Customer Pain – Sensing and Isolating a Problem Today

Response time is terrible; more than one minute.



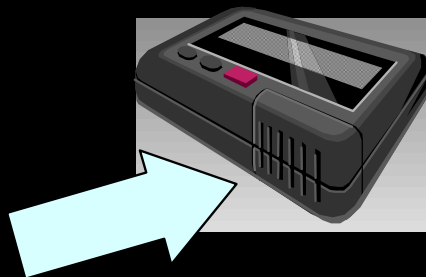
Check all resources

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

Everything looks normal ... but performance is still bad



Bridge Call with Tiger Team

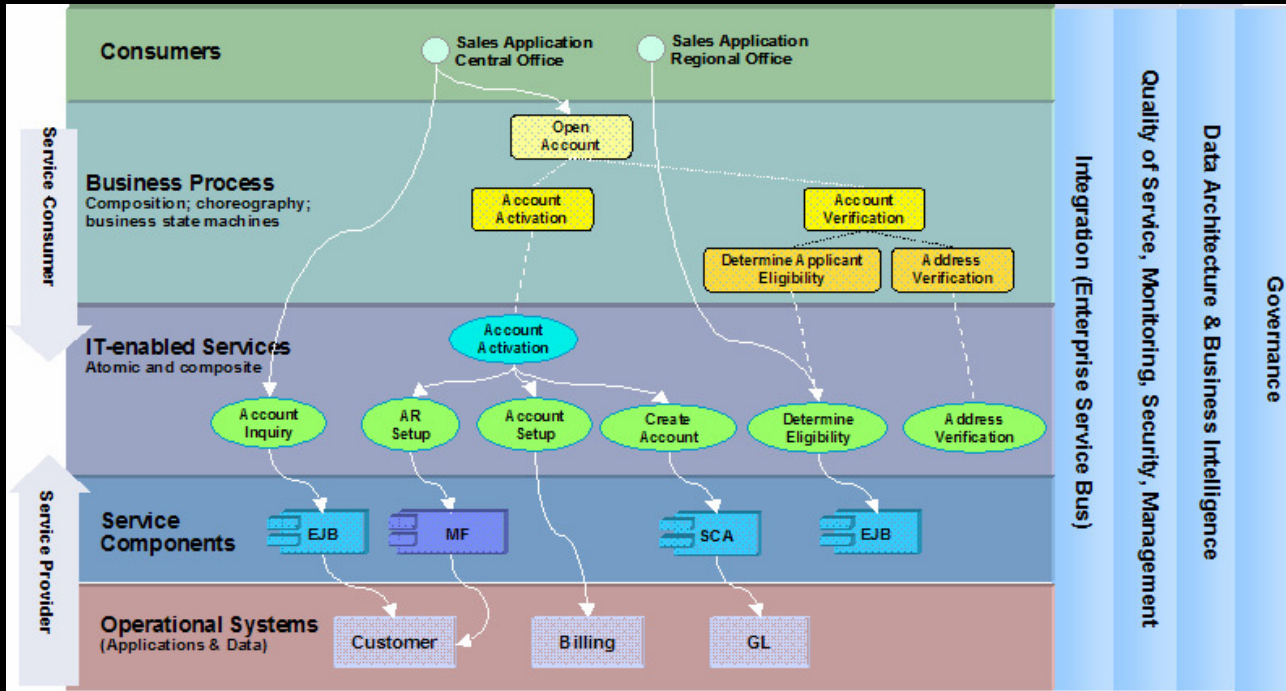


Locate Source of Problem ... maybe ...

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

Source: Monitoring Focus Groups – August 2002

End to End IT, Application, SOA Performance Management

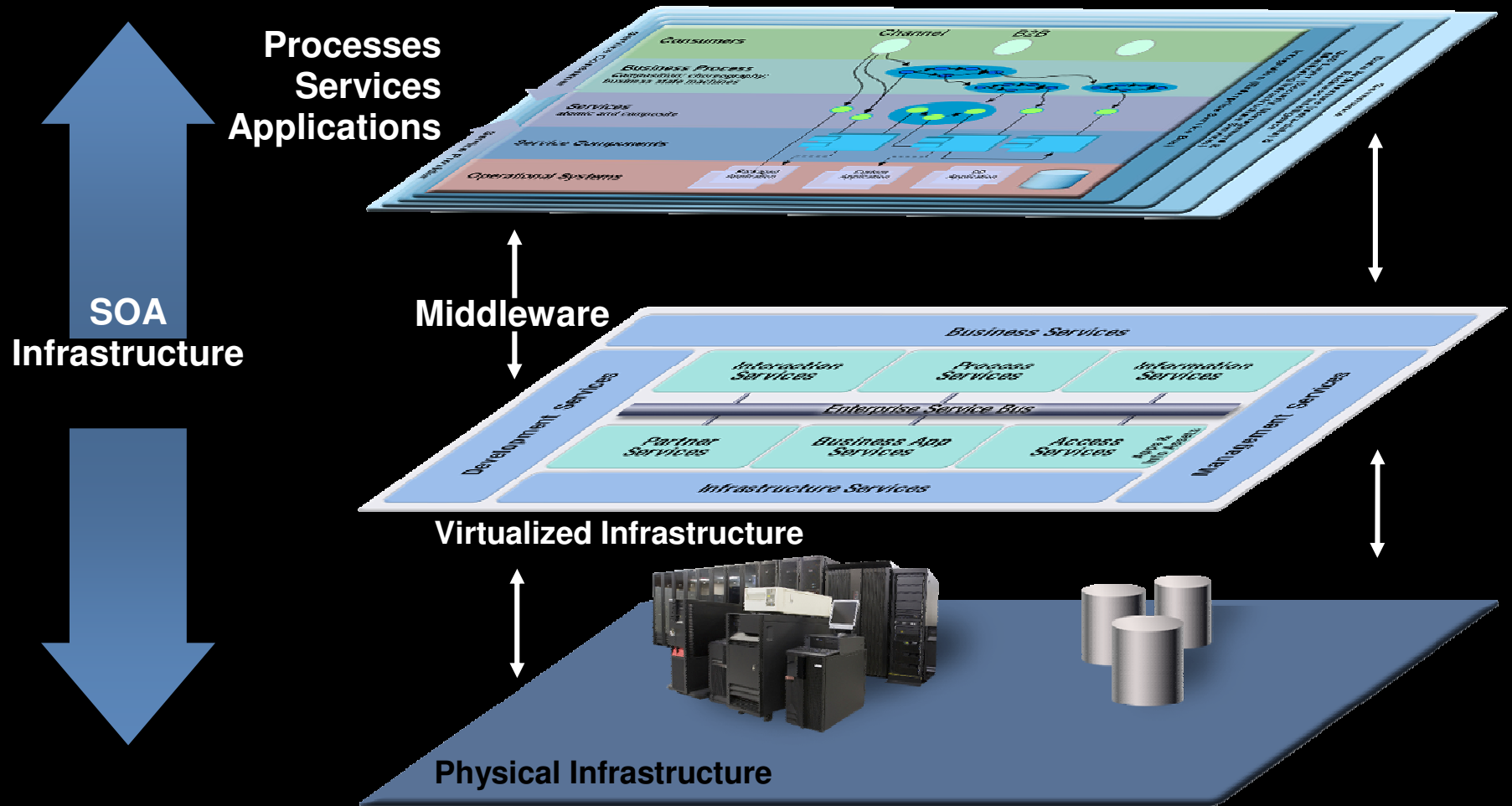


SOA Solution Abstraction Layers

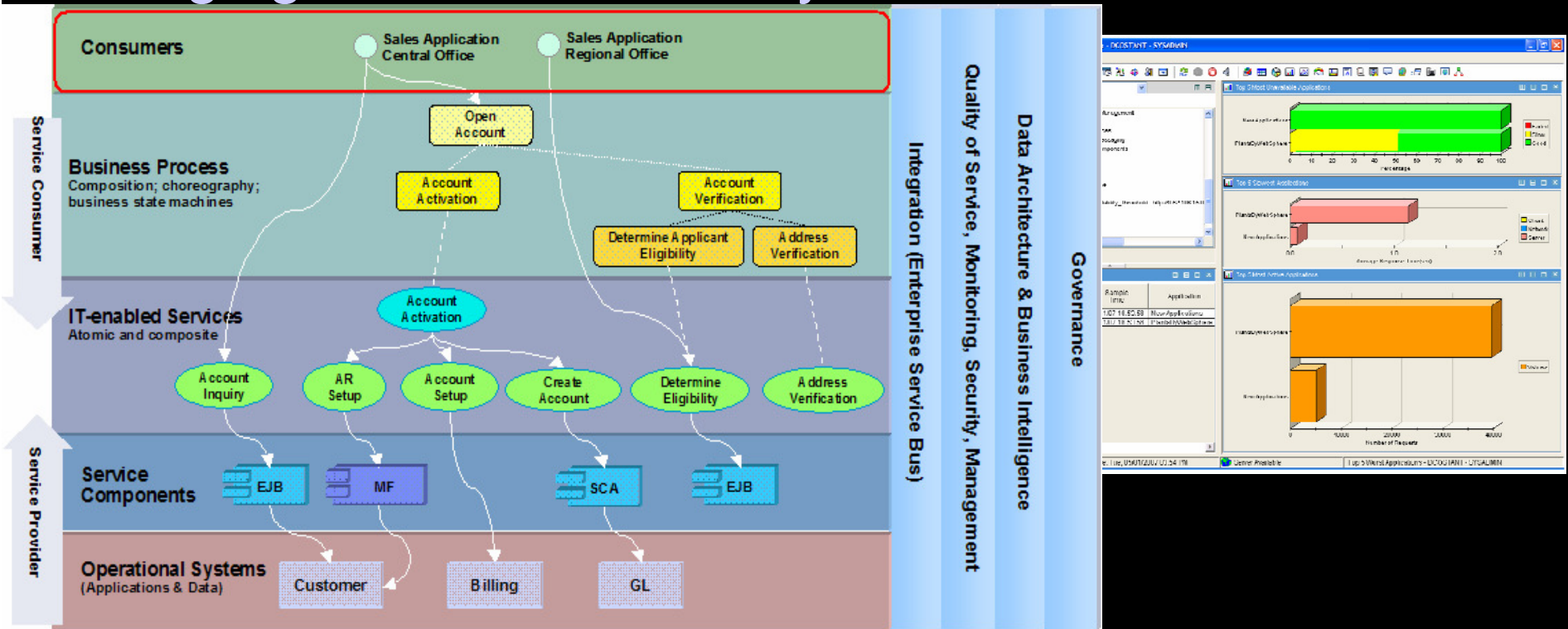
Each layer in the SOA Solution Abstract contains unique management challenges.

IBM provides products to address these challenges

SOA and Layers of Abstraction



Managing the Consumer Layer



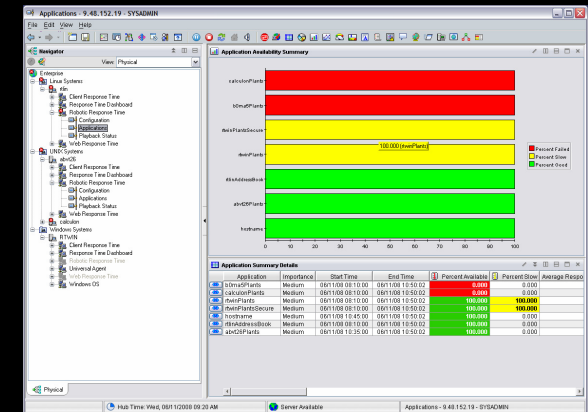
Managing the Consumer Layer

- Monitoring the end user response time to ensure service level agreement compliance.
- Monitoring synthetic transactions – to help understand trends in performance or early problem detection.
- Monitoring the availability of the service and monitoring the end user response times.

Two Approaches to End User Response Time Monitoring

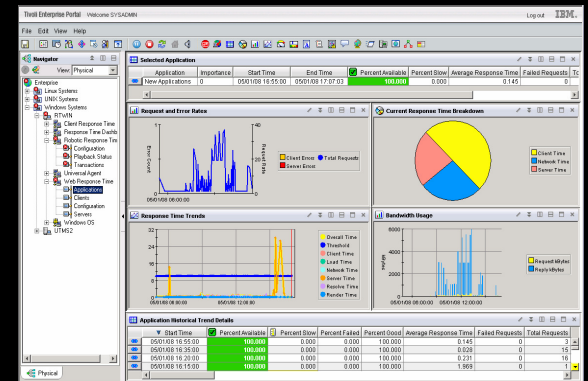
Robotic Transactions

- **Internet Service Monitoring**
 - Periodic testing of service availability & response time
 - Simple and lightweight
- **Robotic Response Time Monitoring**
 - Periodic testing of business applications & transactions
 - Record and execute a set of user defined steps

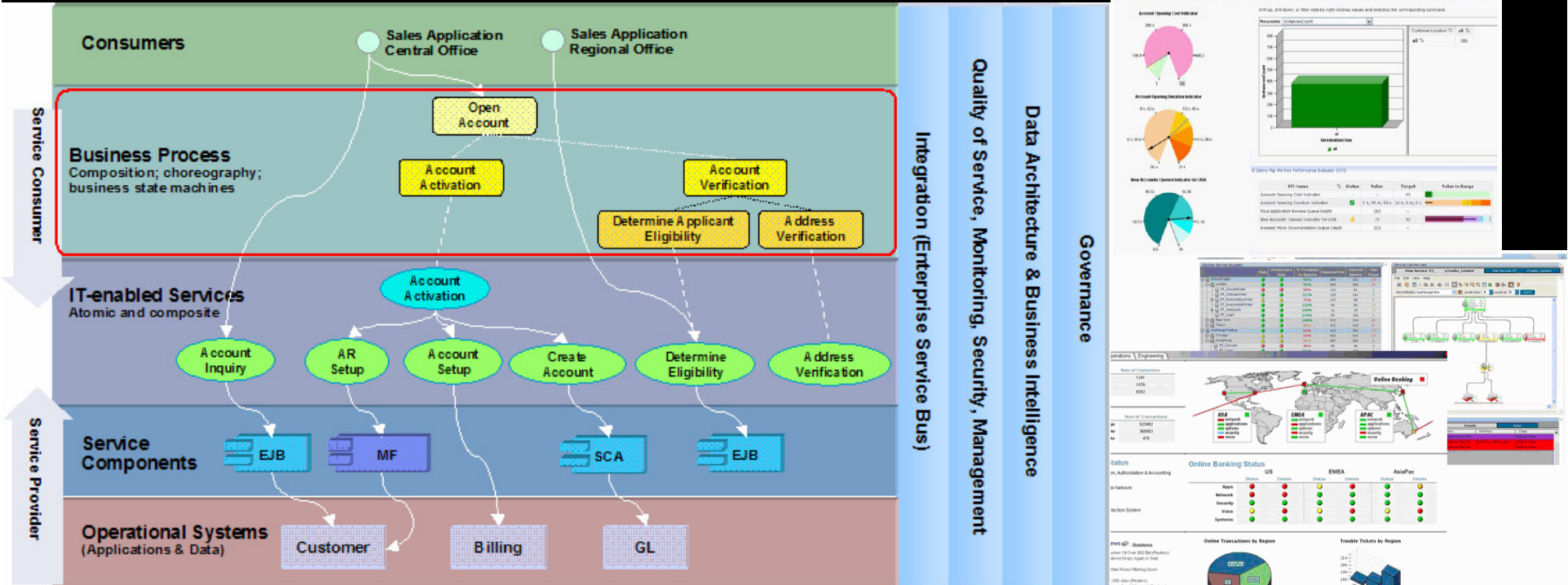


Real End User Transactions

- **Web Response Time Monitoring**
 - Reports end user experience for web applications
 - Appliance mode eliminates overhead at the server
- **Client Response Time Monitoring**
 - Monitor real end user client desktop Windows applications & transactions



Managing the Business Process Layer



Managing the Business Process Layer

Monitoring of the business processe(s) itself from the business perspective.

Monitoring the Business Process from more of an IT perspective.

IT Service: Exec View 2 – Region, Application, Service

The screenshot displays the Tivoli Executive Home Page interface. At the top, it shows the user is logged in as 'Corner Office Executive' and is on the 'Executive Home Page'. The main content area is divided into several sections:

- Left Panel (Region Drilldown):** A tree view showing regions: NorthEast, SouthEast, and Southwest. Each region is expanded to show its constituent applications: Auth, Citrix, Exchange, and SAP. Each application has a status indicator (green dot for OK, red dot for error, yellow triangle for warning).
- Top-Right Table (Application Metrics):** A table showing metrics for various Exchange services.

Service	State	Time	Active Sessions	Failed Transfers	Transfer Time (sec)	MB Transferred
Exchange-NorthEast	OK	OK	95.0	2.0	1.0 sec.	1967.0
Exchange-SouthEast	Error	OK	379.0	8.0	4.0 sec.	5029.0
Exch Inst 1	Error	OK	183.0	2.0	5.0 sec.	2385.0
Exch Inst 2	Error	OK	101.0	3.0	4.0 sec.	1433.0
Exch Inst 3	Error	OK	95.0	3.0	3.0 sec.	1211.0
Exch Srvr 3						
Cisco MIACAT02						
Exchange-SouthWest	Warning	OK	248.0	6.0	3.0 sec.	6845.0
- Bottom-Right (MapView):** A map of the United States titled 'Status by Location' with colored squares indicating service status in different regions: yellow in the West, red in the South, and purple in the Northeast.

Drilldown by Region
 Drilldown by Application

Email Application Metrics & Service Status:
 Metrics rolled up from application
 To region

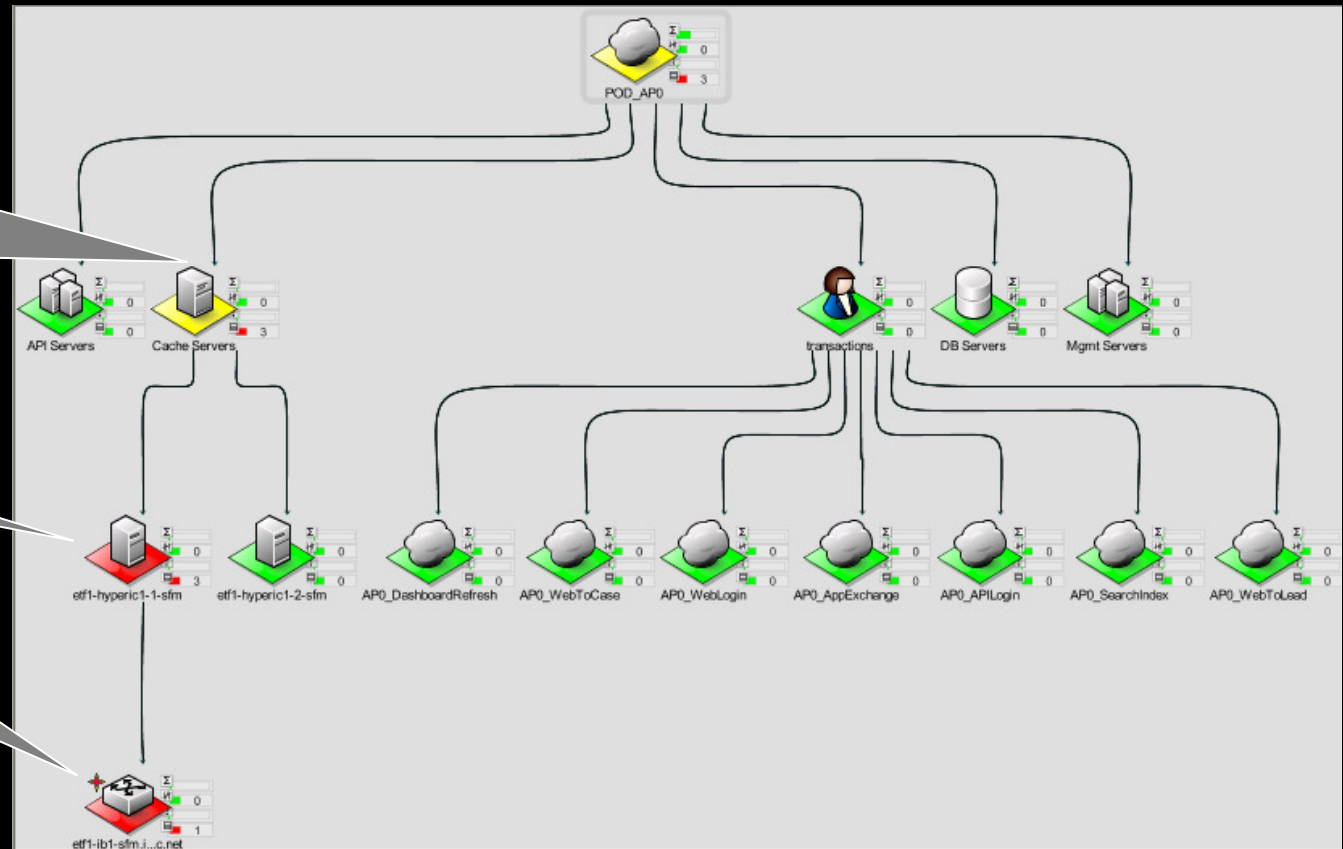
Network Failure RCA & Service Level Correlation (part 2)

Cache Servers instance is marginal (yellow) due to 'Percentage-of child status dependency' (i.e if > 30% children in Critical State, then status is marginal, if > 70% children in Critical State, status is critical).

Parent Service Critical due to 'Worst Child' dependency (i.e. if any children are critical, this service is also critical)

Problem is service affecting (The + icon)

Drilldown to service affecting events



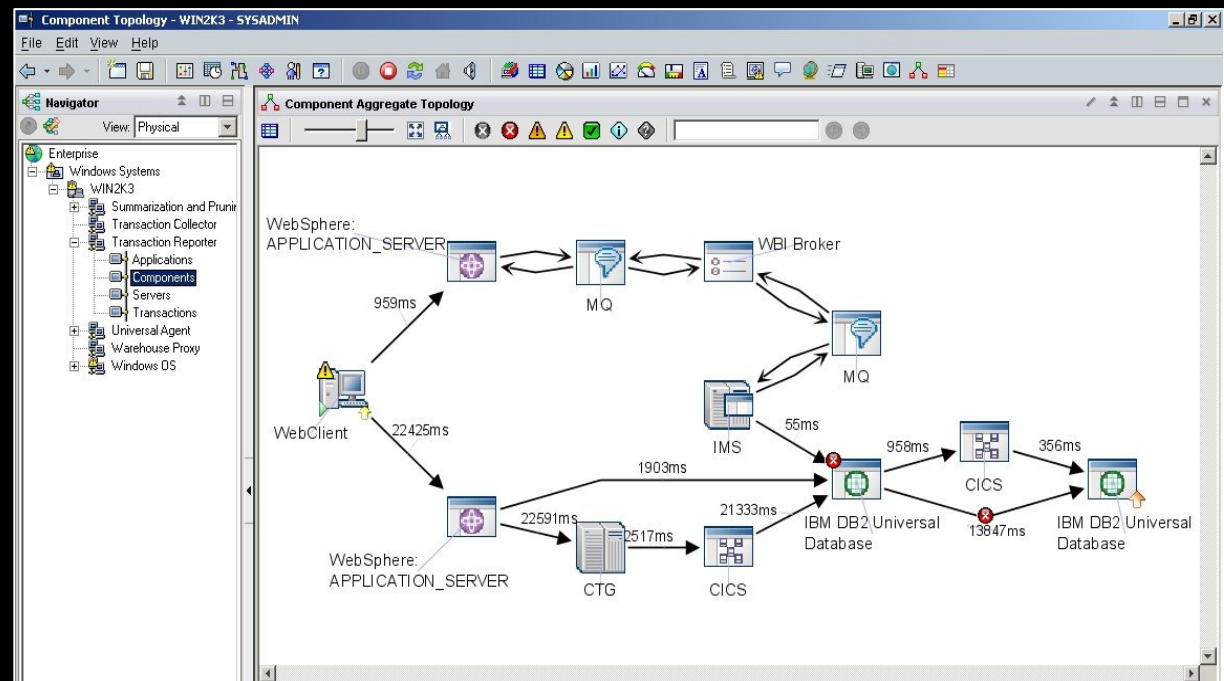
http://.../080/RawEvents_536

Node	Summary	AlertKey	Class	Manager	Serial
10.225.4.2	Device Down		Precision		1212627

Identify the problem

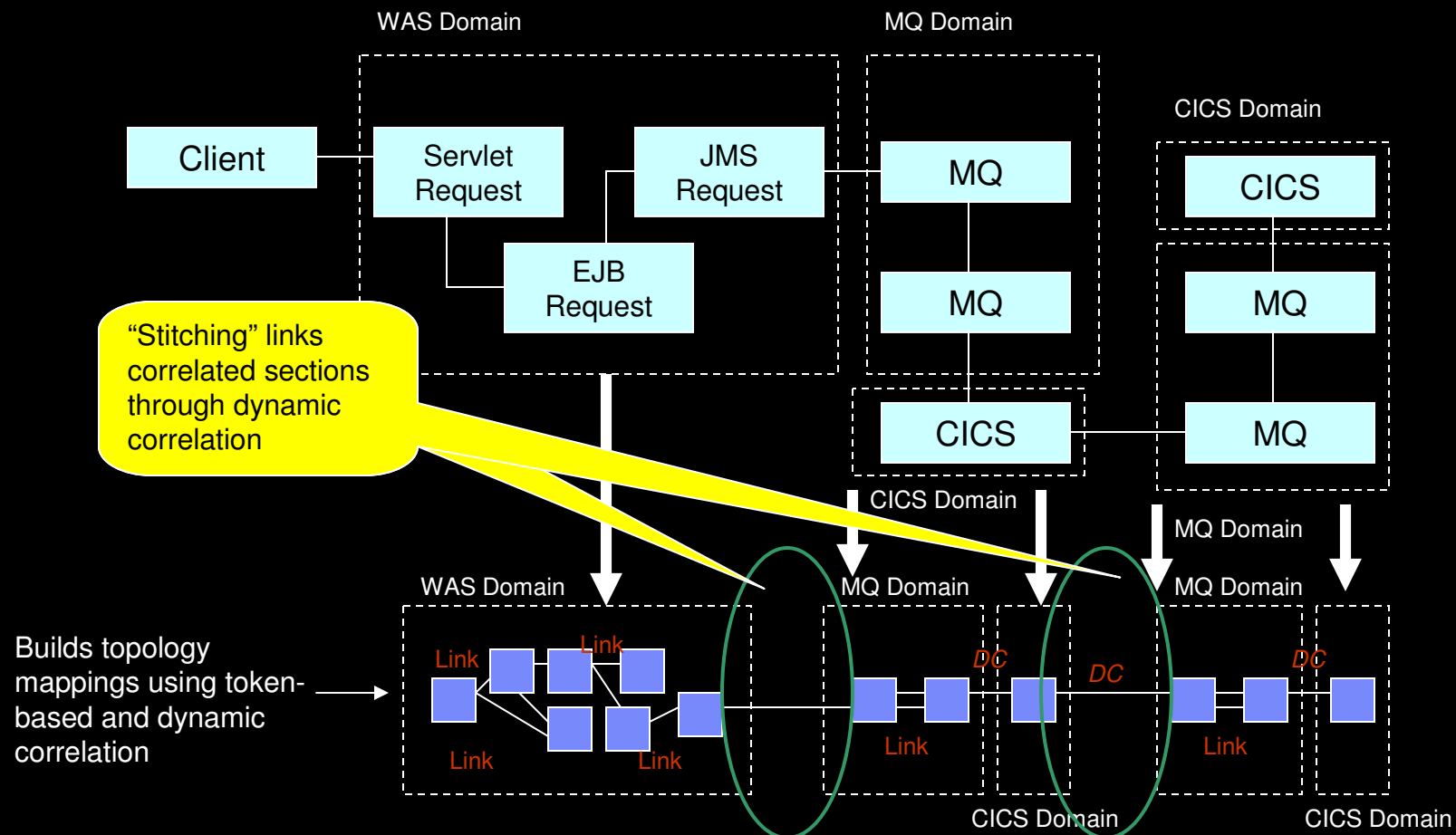
■ ITCAM for Transactions

- Unified, end-to-end transaction tracking across heterogeneous environments
 - fully integrated across distributed and zSeries
- Domain-thru-domain tracking capability via dynamic correlation
- Support for existing ARM instrumentation, plus introduction of a much simpler transaction tracking API (“ARM lite”)
- Makes token-based based tracking more consumable, less dependent on how systems are connected
- Support for asynchronous transactions
- Extensible, modular framework
- Integrated response time and transaction tracking



Enterprise-Wide Tracking

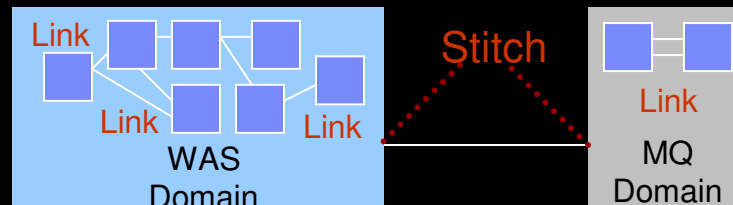
- Track inside domains with correlated techniques
- Track across domains through stitching



Builds topology mappings using token-based and dynamic correlation

Dynamic Correlation

- Dynamic correlation is a technique for enabling transaction tracking from one application domain to another. A domain here refers to a section of a transaction that utilizes a similar tracking technology, E.g. WAS, or MQ, or a native customer application.
- “Stitching” is the term we use to define the way we apply the dynamic correlation technique within the tracking product to track an individual transaction between two domains.



- The dynamic correlation will match configured attributes from each side of the domain boundary to create a “stitch”. For example, the set of common attributes between MQ and CICS may be of this form:

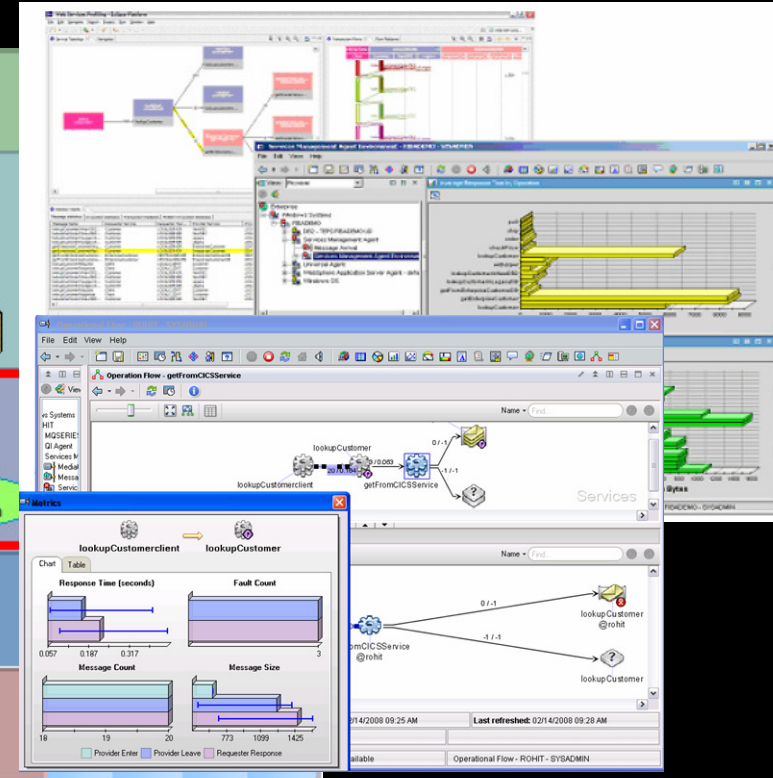
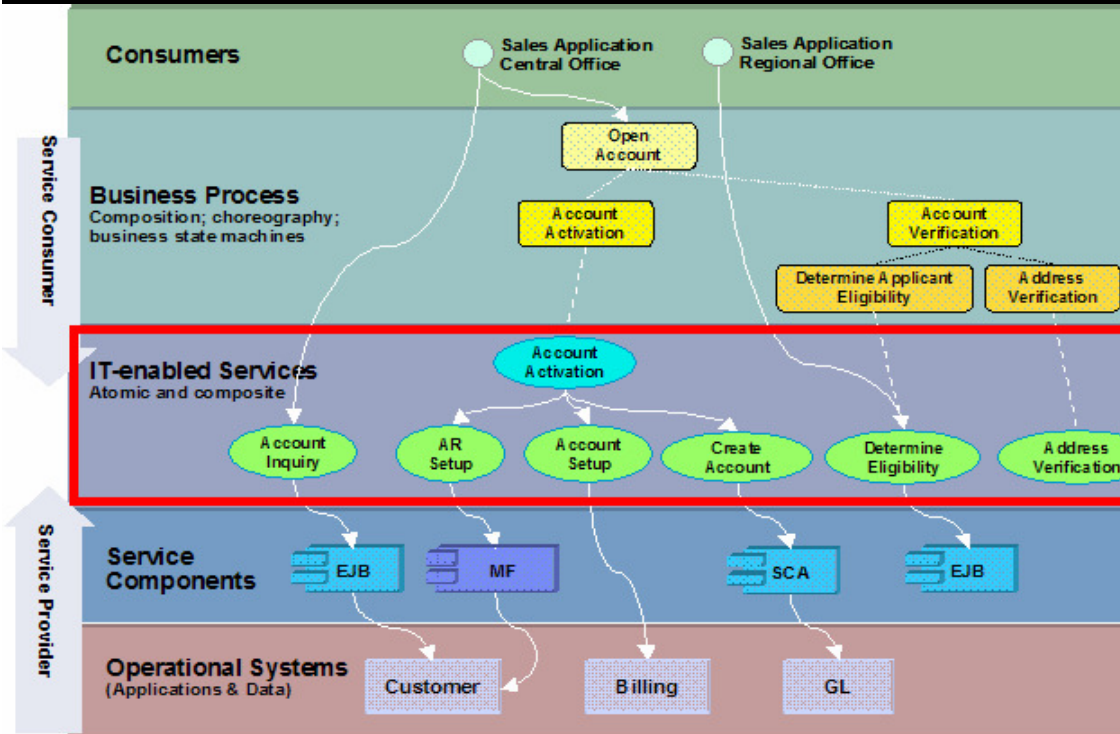
Outgoing WAS transaction attributes	Incoming MQ transaction attributes
Application Name	
Source Host	Connecting Server name
Thread ID	
Destination Queue Manager	Connected Queue Manager
Destination Queue	Opened Queue
	Message ID
etc.	etc.

Attributes in **red** show the common set of attributes that define a unique transaction instance.

Application Domain Coverage in Transactions v7.1

- IBM WAS
 - WebSphere 5/6/7 tracking support is leveraged from BCI technology embedded in the ITCAM for WAS product on distributed and z/OS systems
- BEA
 - BEA Weblogic and JBoss are supported via ITCAM for J2EE for distributed systems
- MQ 5/6
 - MQ 7, 6.0 and 5.3 can be tracked by the ITCAM for Transactions product natively. This is available for both distributed and z/OS systems
- WMB
 - WebSphere Message Broker v6.0 is instrumented natively on distributed and z/OS in MQ environments
- CICS
 - CICS 2.3+ transactions and services can be tracked with the ITCAM for CICS. This broadly includes any CICS hosted applications (C++, COBOL, Natural, etc.).
 - IMS instrumentation is embedded in ITCAM for IMS for z/OS systems
 - DB2 Tracking is inferred via CICS exits (DB2CONN) on z/OS as part of ITCAM for CICS
- IMS
 - CICS Transactions Gateway 7.1 support will be made available or request or via OPAL. It is expected that CTG will be delivered fully supported in 2H08
- DB2
 - Tracking support through ITCAM for SOA for web services such as WebSphere Application Server, WebSphere ESB, WebSphere Process Server, WebSphere CE, WebSphere Datapower, Weblogic, AXIS 1.2 with Weblogic, CICS Web Services, SAP Netweaver, JBoss
- CTG
 - Existing ARM 2.0/4.0 deployments that are instrumented e2e via an existing RTT 6.0 deployment will be supported via native library linkages (libarm).
- SOA
 - Customer instrumented tracking is made possible via our published Transaction Tracking API (TTAPI) which is available for a range of languages, on both distributed and z/OS systems. Current language binding supported are:
 - C, C++, Java (distributed)
 - C, C++, Java, COBOL, PL/I and Assembler (z/OS)
- ARM
 - Additionally, CICS transactions also have supporting libraries for assisting instrumentation of custom code if required (optional). Note that additional z/OS language domains are feasible.
- TTAPI
 -

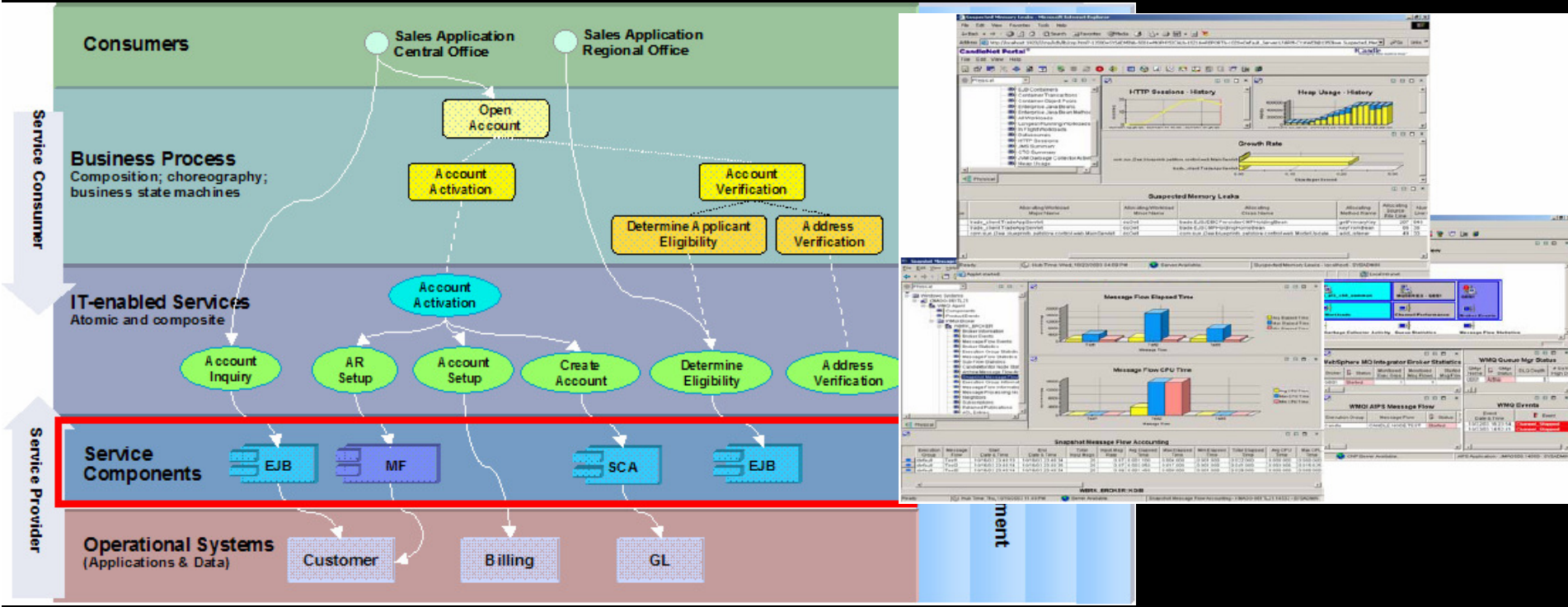
Services Layer



Managing the Services Layer
 Discovering service requests flowing through the target environment and reconciling those services with those contained within a registry and understanding how services relate to each other, to the IT infrastructure, and business process layers.

Controlling the message flow in the services environment through management mediations to avoid SLA violations and Providing for centralized service management policies and setting business-related IT goals.

Service Components Layer

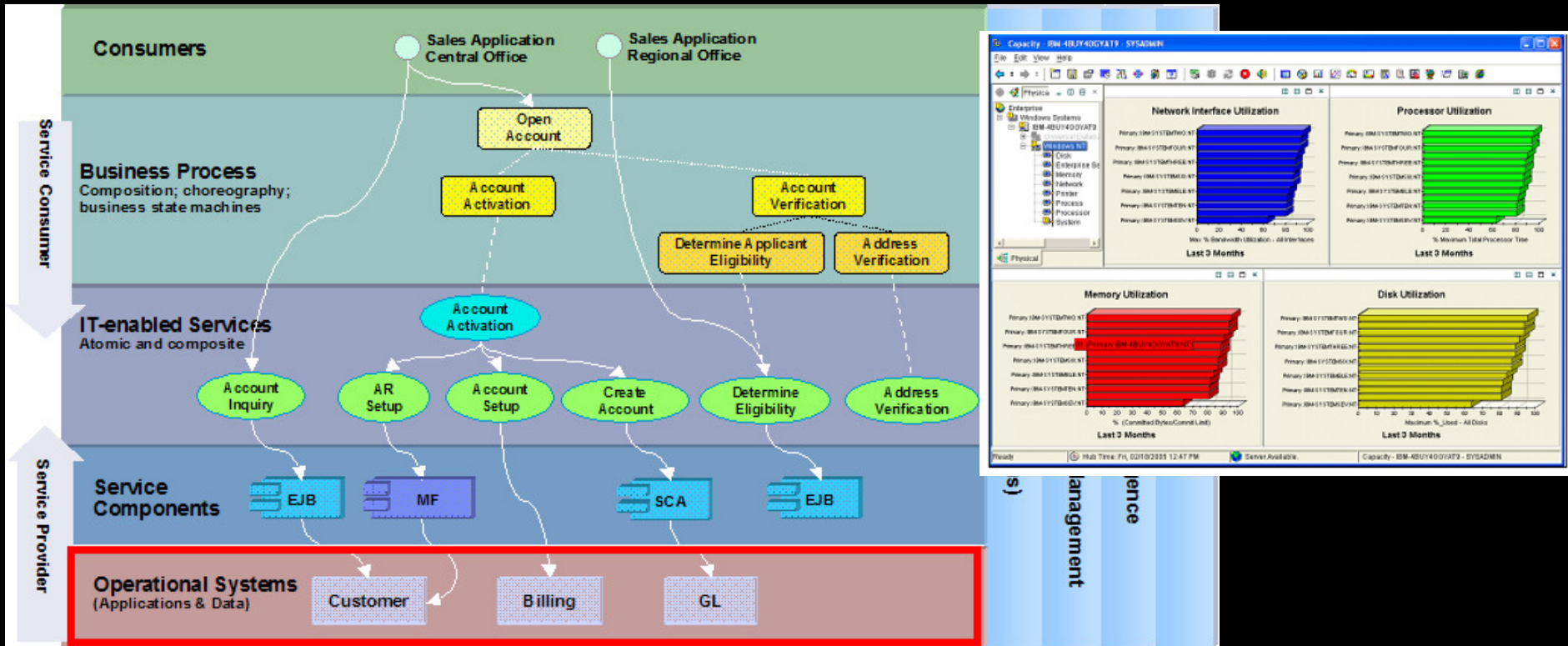


Managing the Service Components Layer

Understanding the health and performance of the applications and middleware supporting the services.

Correlating problems in the services to infrastructure issues such as a queue filling up or an exhausted thread pool

Operational Systems Layer

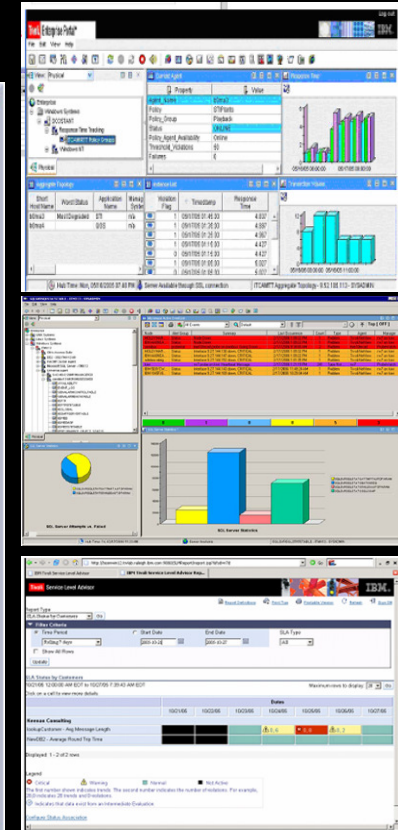
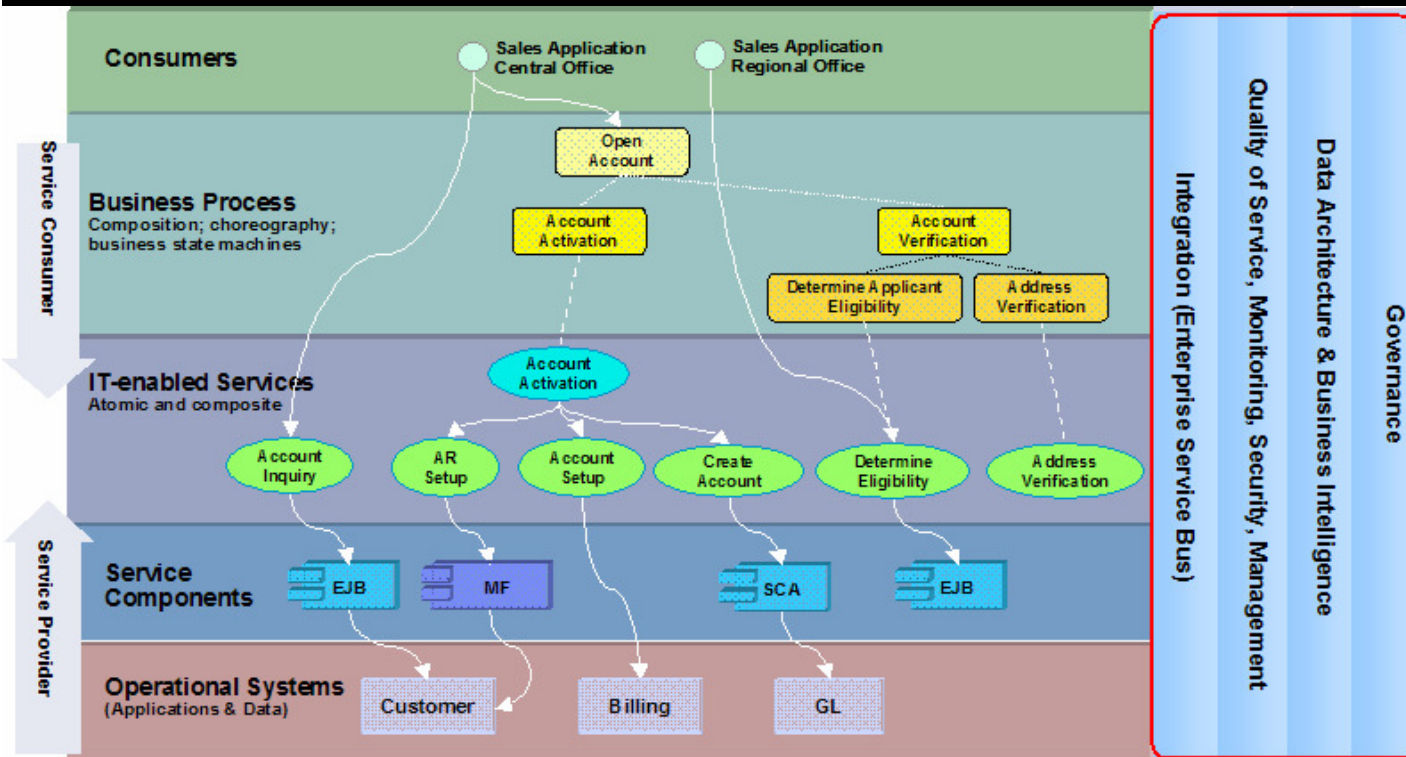


Managing the Operational Systems Layer

Understanding the health of the infrastructure supporting the services and service components

Includes: Managing the Operating System and underlying resources including databases

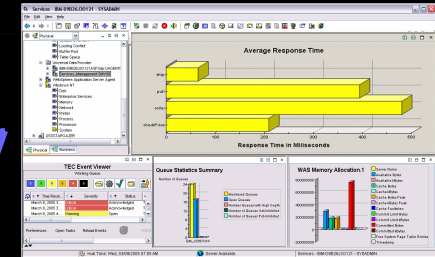
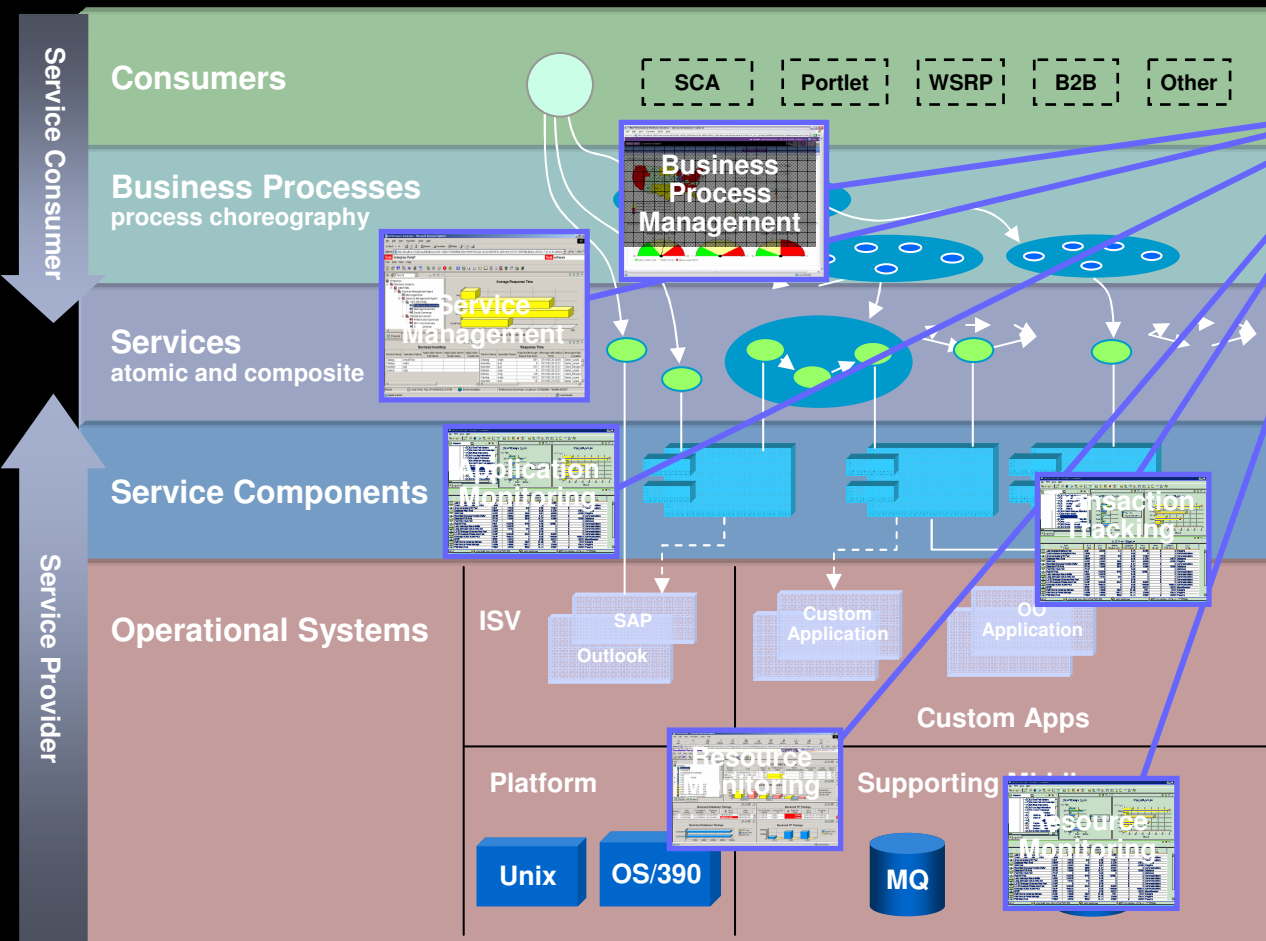
Management Back Plane



Management Back Plane

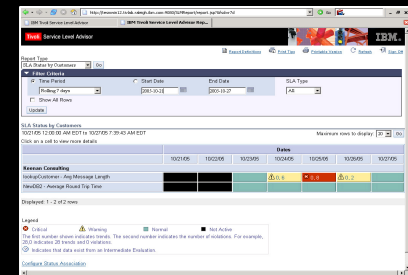
Each of the management disciplines in some way cross the entire solution through:
 Managing Transaction Performance, Event Correlation, Service Level Agreements

A Complete View of IT, Application, SOA Management



Integrated Console

- Allow for seamless views across different layers of abstraction.

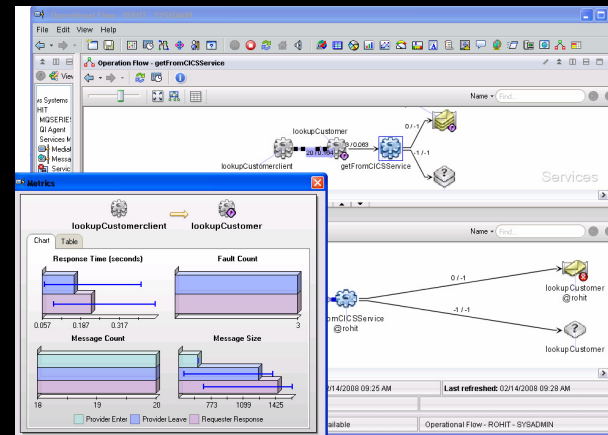


Integrated Reporting

- Generate enterprise-wide service level reporting

Service problem identification and resolution

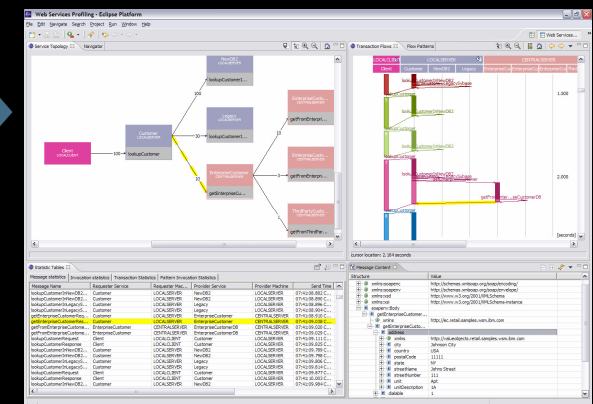
- To ensure service levels conform to agreed upon specifications, you need:
 - Views and analysis of Web service interactions for IT Operations to quickly identify source of errors, and take corrective action through situations, workflow and mediations
 - Detailed views of operational SOAP/XML message content, flow patterns and topology for Web services experts and support teams
 - Highly performing and flexible enforcement points



“Don’t give me another console”



“Show me the service & flow details!”



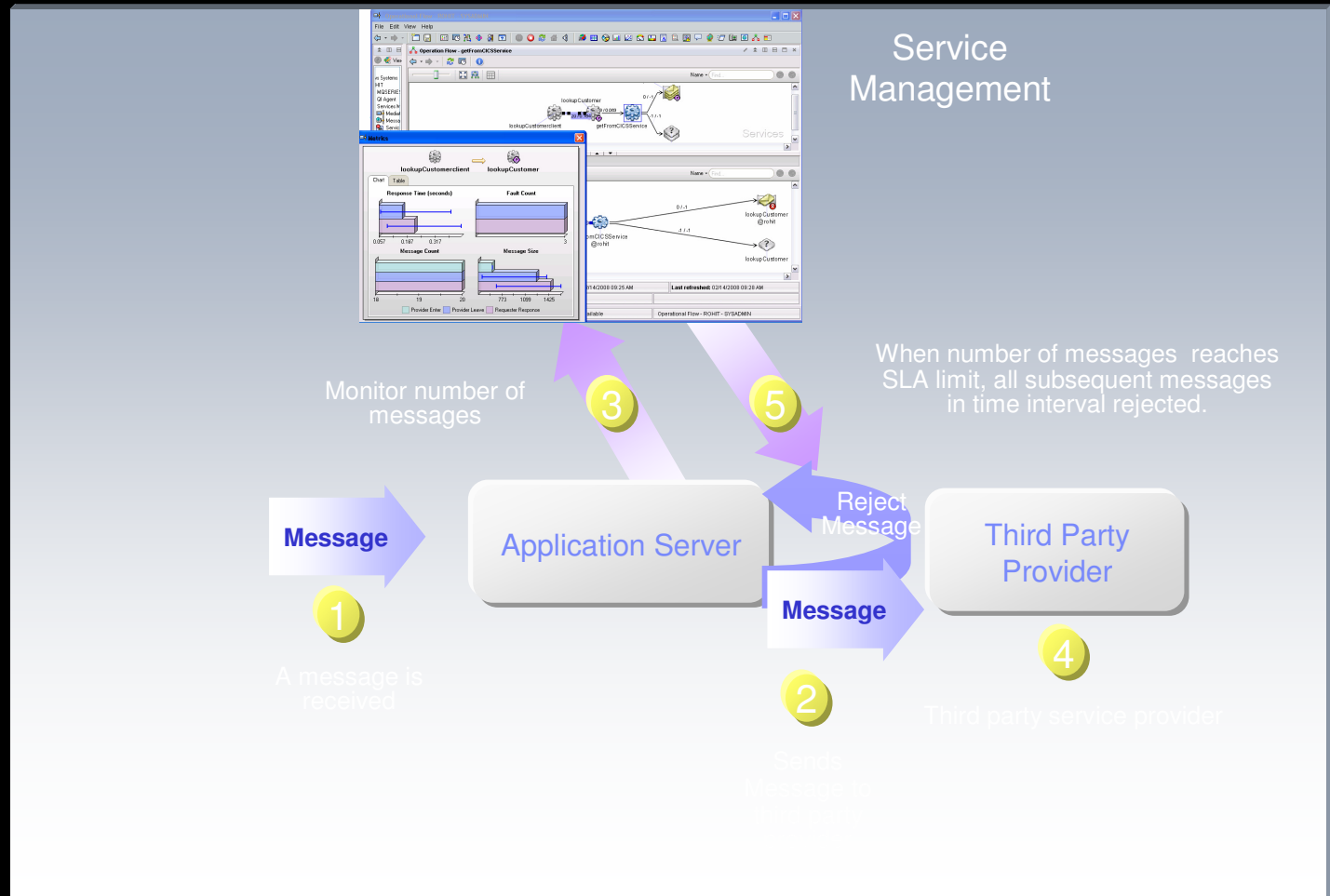
Scenario: Automatic Enforcement of Defined SLAs

Business challenge

- SOA must support meeting Service Level Agreements (SLAs).
- Specific SLA for number of requests that can be made to third party requestor.

Metrics and Automation

- Am I meeting my SLAs?
- Automatic rejection of service Requests once threshold met.



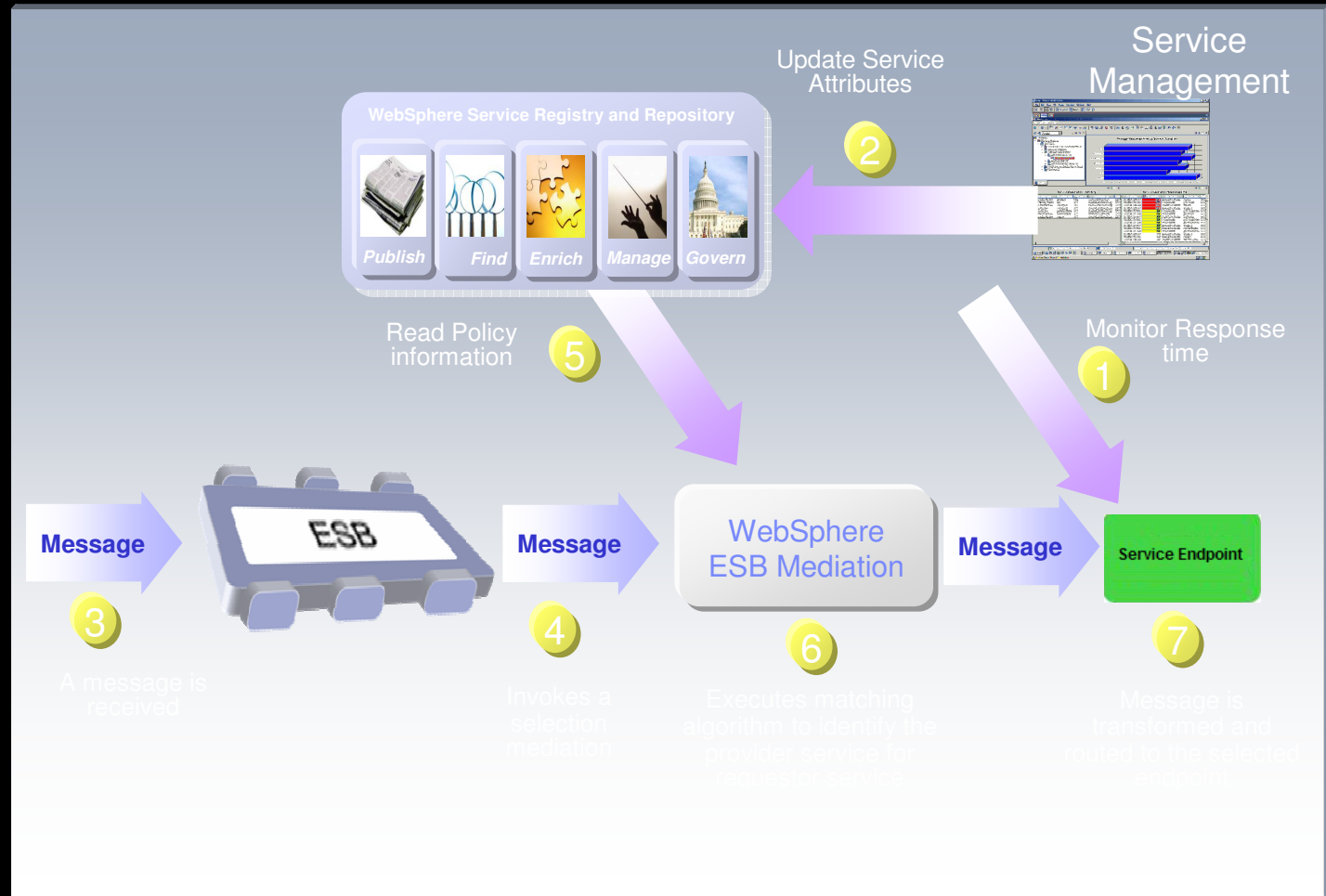
Scenario: Dynamic service selection based on QOS

Business challenge

- SOA must support meeting Service Level Agreements (SLAs).
- Production disruption when adding and removing service endpoints
- If Service instances are not responsive, then the architecture needs to redirect requests to alternate service choices to meet the SLAs.

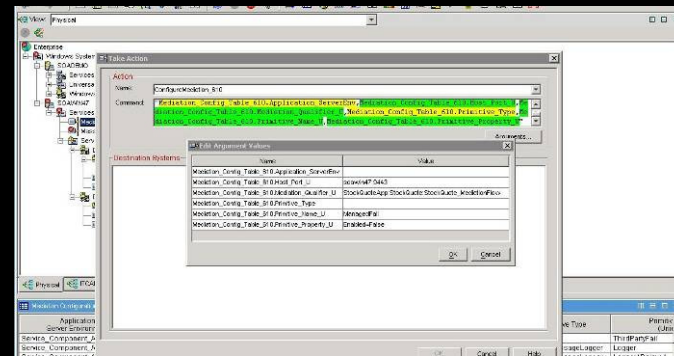
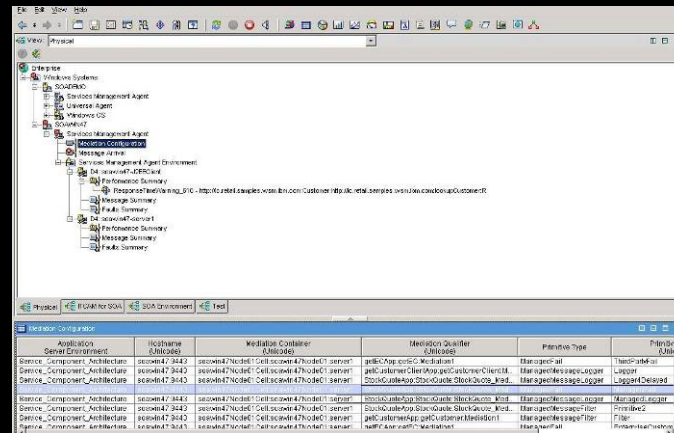
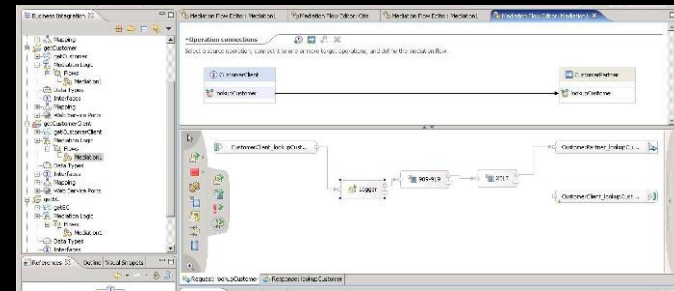
Metrics

- Am I meeting my SLAs?
- Service response time



Emphasizing management early in the lifecycle

- ITCAM support of WebSphere Integration Developer (WID) provides the ability to place management control points (mediation) in ESB systems
- ITCAM for SOA includes workspace to configure these mediations once application is deployed
- Operators can take action to enable / disable managed mediations to support runtime changes to the management policy



Remote MQ Agent

Host name in Navigator indicates the host where Remote Agent resides on

Remote Queue Manager name

In Queue Manager Status workspace, Host Name column indicates the host name where Remote Queue Manager is running on

The screenshot displays the Queue Manager Status interface for a remote agent. The left pane shows a tree view of the system hierarchy, with 'QMREMOTE' selected. The right pane contains two summary charts: 'Queue Summary' and 'Channel Summary'. The bottom pane shows a table of Queue Manager instances.

QMgr Name	Host Name	QMgr Subsys	Host Jobname	Start Date & Time	QMgr Status	QMgr Type	DLQ Depth	DLQ Maximum	Monitored Queues	Local Queues	Remote Queues	Alias Queues	Transmit Queues	Predefined Queues	Dynamic Perm Qs
QMREMOTE	tivn54			Not Available	Active	UNIX	0	0	26	21	1	1	2	21	0

MQ 7.0 Pub/Sub Support

Maximize the visibility and ease of monitoring for WebSphere MQ

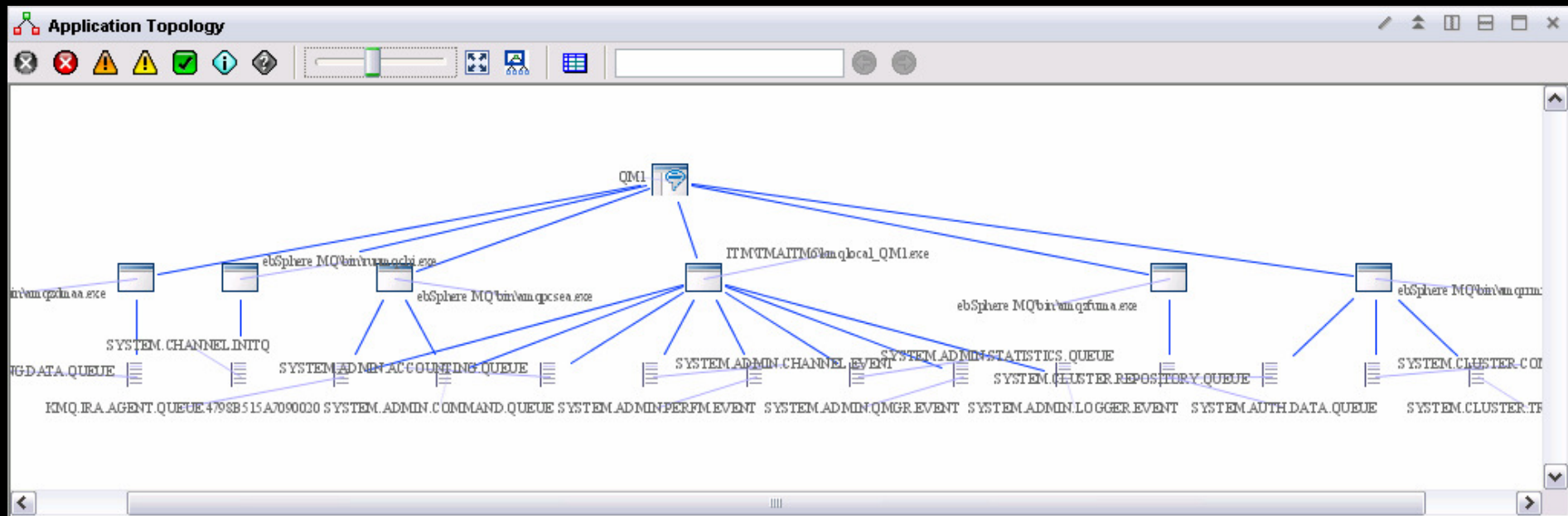
The screenshot displays the IBM MQ Administration Center interface. The main window shows a 'Topology' view of a topic structure. A topic named 'STOCKS' is at the top, with two sub-topics, 'TEST1' and 'TEST2', branching off from it. Below these, there are further sub-topics and subscriptions. An orange oval highlights the 'Publish/Subscribe' option in the left-hand 'Navigator' pane. To the right of the topology diagram is a 'Number of Messages' bar chart showing message counts for various subscriptions. At the bottom, a 'Topic Status by Search' dialog box is open, allowing users to search for specific topics or subscriptions based on various criteria.

Topic String	Msg Count	Sub ID	Sub
STOCKS	6	414D5120716D2E64656681756C7420207C44994720014	
STOCKS	3	414D5120716D2E64656681756C74202018FF8A4720005	
STOCKS	2	414D5120716D2E64656681756C74202018FF8A4720003	

- Workspaces to assist users debug pub/sub related problems
- Topic topology – Allow users to visualize topics in a topological form.
- Search function – Provide both simple and advanced search functions so that users can narrow down into the set of topics or subscriptions that they are interested in.

MQ Application Topology - Overview

- Available in “Application Connections” workspace. Improve visualization of WMQ management by graphically displaying application topology
- 4 Modes of Topology View designed for different focuses upon the objects covered by the topology
- Customization enabled for users to narrow down the topology, and to limit the scalability



MQ Message Flow Workspaces - New

The screenshot displays the MQ Message Flow Workspaces interface. On the left is a Navigator tree showing the system hierarchy. The main area contains several monitoring windows:

- Message Flow Throughput**: A bar chart showing Occurrence vs. End Date & Time. Legend: Total Input Msgs (yellow), Total Commits (blue), Total Backouts (red).
- Message Flow Elapsed Time**: A bar chart showing Microseconds vs. End Date & Time. Legend: Avg Elapsed Time (yellow), Max Elapsed Time (blue), Min Elapsed Time (red).
- Recent Message Flow Start Rate**: A line chart showing Occurrence per second vs. End Date & Time.
- Recent Message Flow CPU Time**: A bar chart showing CPU Time vs. End Date & Time.

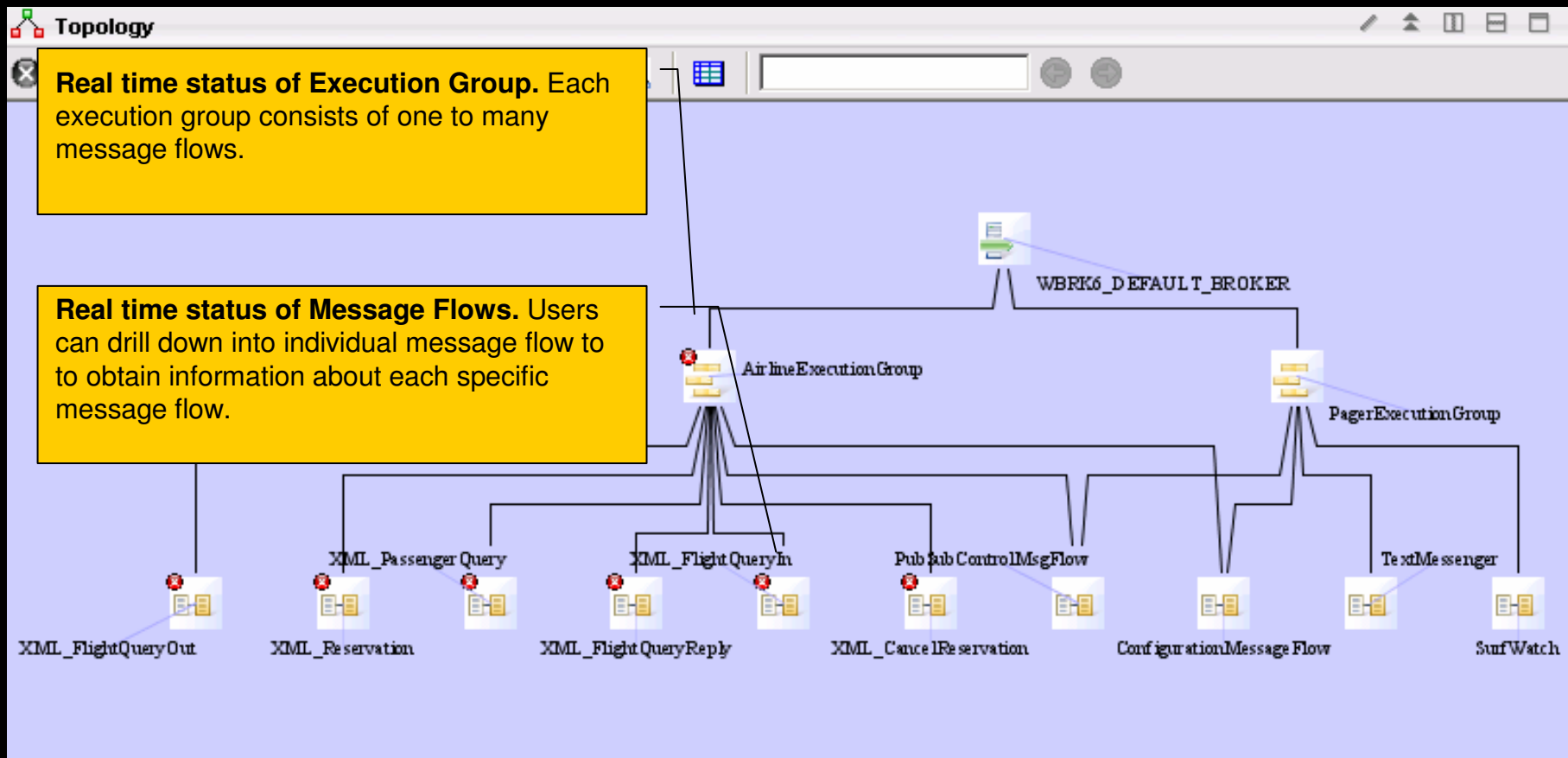
At the bottom, a table titled "Recent Snapshot Message Flow Accounting" provides detailed data for two message flows:

Execution Group	Message Flow	Start Date & Time	End Date & Time	Total Input Msgs	Input Msg Rate	Input Byte Rate	Avg Elapsed Time	Max Elapsed Time	Min Elapsed Time	Total Elapsed Time
default	XML_PassengerQuery	09/01/07 14:52:45	09/01/07 14:53:06	96	4.72	2,338.47	0:021:885	1:002:000	0:001:000	2:101:000
default	XML_PassengerQuery	09/01/07 14:52:10	09/01/07 14:52:45	159	4.45	2,201.48	0:014:308	1:033:000	0:001:000	2:275:000

Message Flow Accounting
 -Message Flow Throughput: shows the Total Input Message, Total Committed, Total blackout.
 -Message Flow Elapsed Time: shows the Total Input Message Rate, Total Committed Rate, Total blackout Rate.

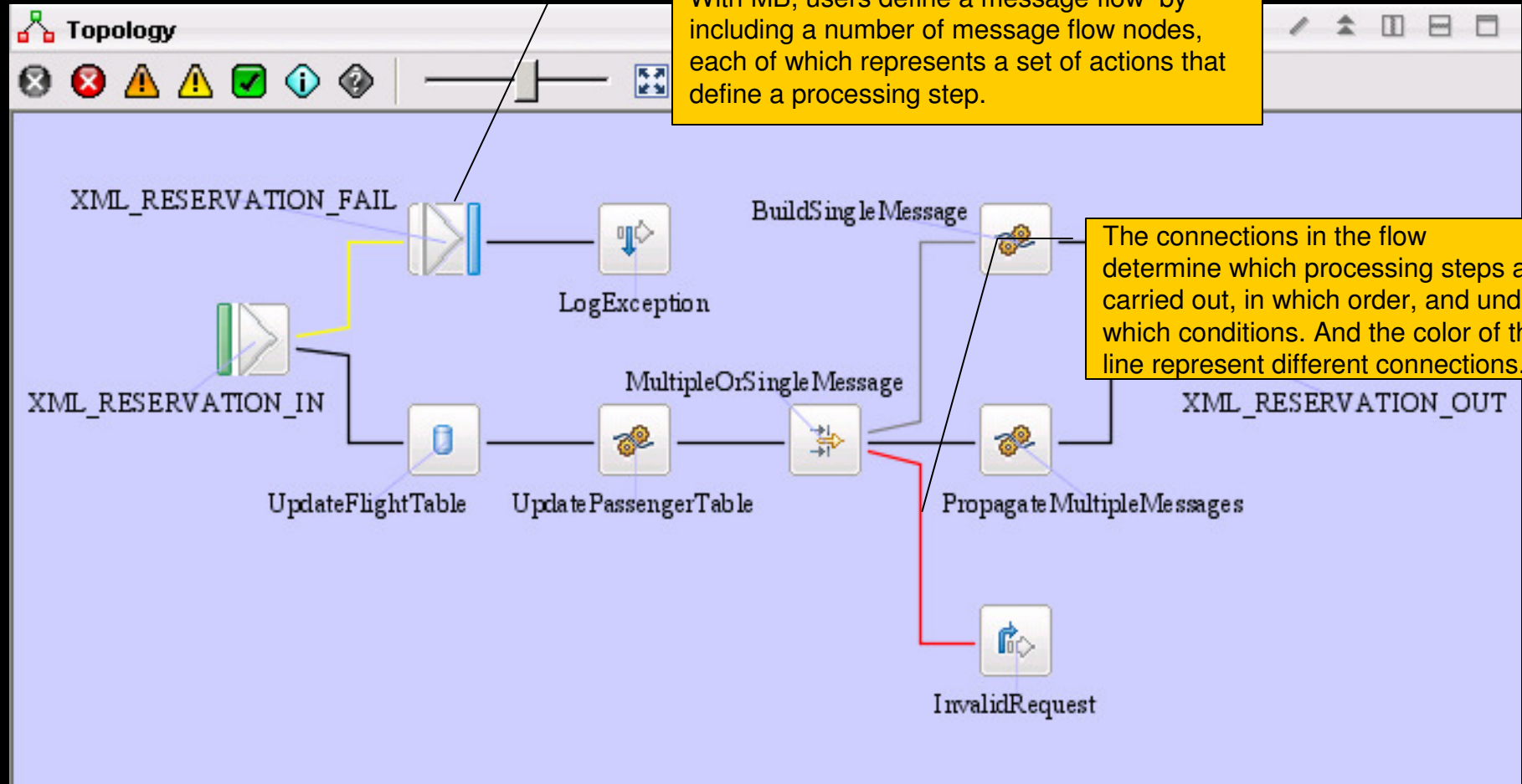
Recent/Historical Message Flow Accounting Workspaces
 -Recent/Historical Message Flow Throughput: shows the Total Input Message, Total Committed, Total blackout
 -Recent/Historical Message Flow Start Rate: shows the Total Input Message Rate

MQ Message Broker Topology



MQ Message Broker Message Flow Topology

With MB, users define a message flow by including a number of message flow nodes, each of which represents a set of actions that define a processing step.



The connections in the flow determine which processing steps are carried out, in which order, and under which conditions. And the color of the line represent different connections.

WebSphere MQ Queue Manager Overview Report (Yearly, Monthly, Weekly, Daily)

- Total availability for all queue managers Pie Chart
 - All or selected servers

- Top Ten Unavailable Queue Managers
 - Top Ten Unavailable Queue Managers Chart
 - Top Ten Unavailable Queue Managers Table

- Top Ten Available Queue Managers
 - Top Ten Available Queue Managers Chart
 - Top Ten Available Queue Managers Table

IBM

Application Resource Report

WebSphere MQ Queue Manager Availability Report Parameters

Begin Date: 2008-1-1 End Date: 2008-4-15
 Sampling Interval: 15 Min

WebSphere MQ Queue Manager Availability

QM Availability

Status: Available (Green), Unavailable (Red)

WebSphere MQ Top Ten Unavailable Queue Manager

WebSphere MQ Queue Manager Top Ten Unavailable Table

Availability	Host Name	QM Name	Connection Count	Curr Log	Recovery Log
48%	Machine9	Machine9_QM	4		/var/mqm/log/Machine9_QM/active/
76%	Machine3	Machine3_QM	4		/var/mqm/log/Machine3_QM/active/
78%	Machine11	Machine11_QM	4		/var/mqm/log/Machine11_QM/active/
78%	Machine13	Machine13_QM	4		/var/mqm/log/Machine13_QM/active/
85%	Machine18	Machine18_QM	4		/var/mqm/log/Machine18_QM/active/
89%	Machine17	Machine17_QM	4		/var/mqm/log/Machine17_QM/active/
92%	Machine6	Machine6_QM	4		/var/mqm/log/Machine6_QM/active/
95%	Machine1	Machine1_QM	4		/var/mqm/log/Machine1_QM/active/
96%	Machine4	Machine4_QM	4		/var/mqm/log/Machine4_QM/active/
96%	Machine5	Machine5_QM	4		/var/mqm/log/Machine5_QM/active/

WebSphere MQ Top Ten Available Queue Manager

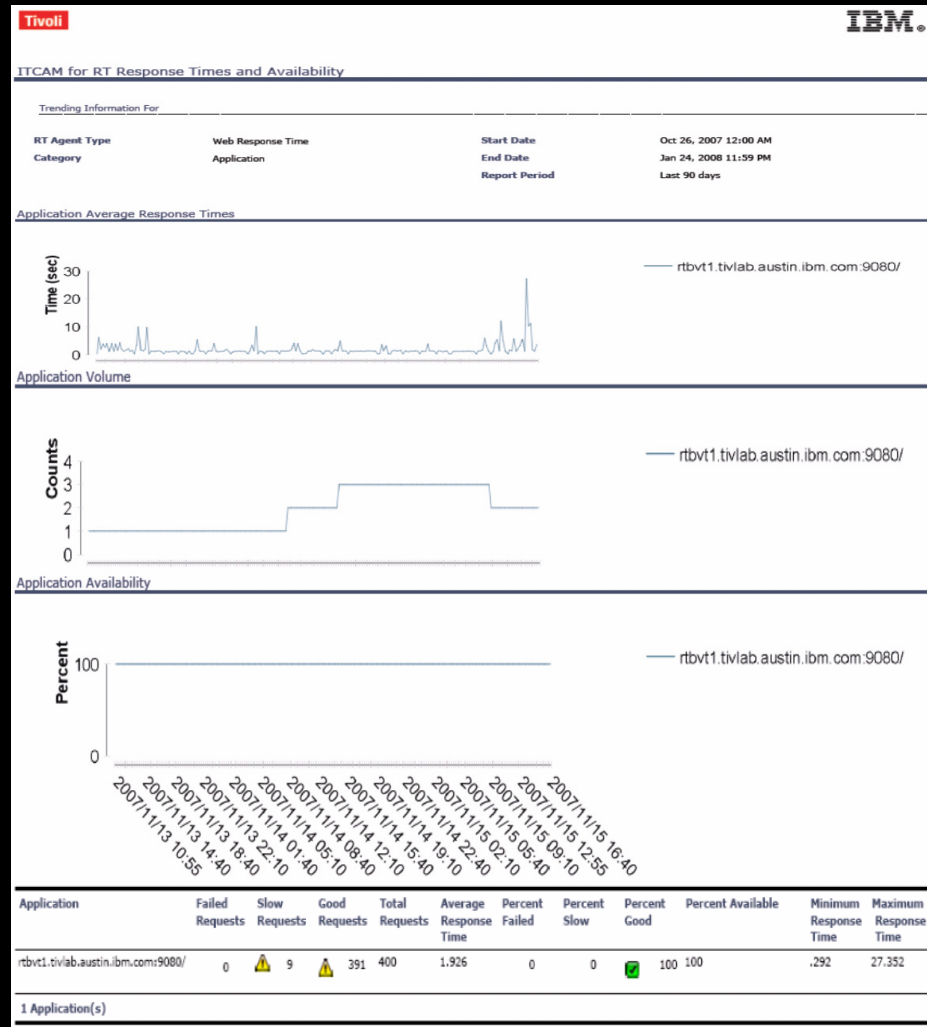
WebSphere MQ Queue Manager Top Ten Available Table

Availability	Host Name	QM Name	Connection Count	Curr Log	Recovery Log
96%	Machine12	Machine12_QM	4		/var/mqm/log/Machine12_QM/active/
98%	Machine15	Machine15_QM	4		/var/mqm/log/Machine15_QM/active/
98%	Machine8	Machine8_QM	4		/var/mqm/log/Machine8_QM/active/
97%	Machine14	Machine14_QM	4		/var/mqm/log/Machine14_QM/active/
97%	Machine16	Machine16_QM	4		/var/mqm/log/Machine16_QM/active/
100%	Machine10	Machine10_QM	4		/var/mqm/log/Machine10_QM/active/
100%	Machine19	Machine19_QM	4		/var/mqm/log/Machine19_QM/active/
100%	Machine20	Machine20_QM	4		/var/mqm/log/Machine20_QM/active/
100%	Machine2	Machine2_QM	4		/var/mqm/log/Machine2_QM/active/
100%	Machine7	Machine7_QM	4		/var/mqm/log/Machine7_QM/active/

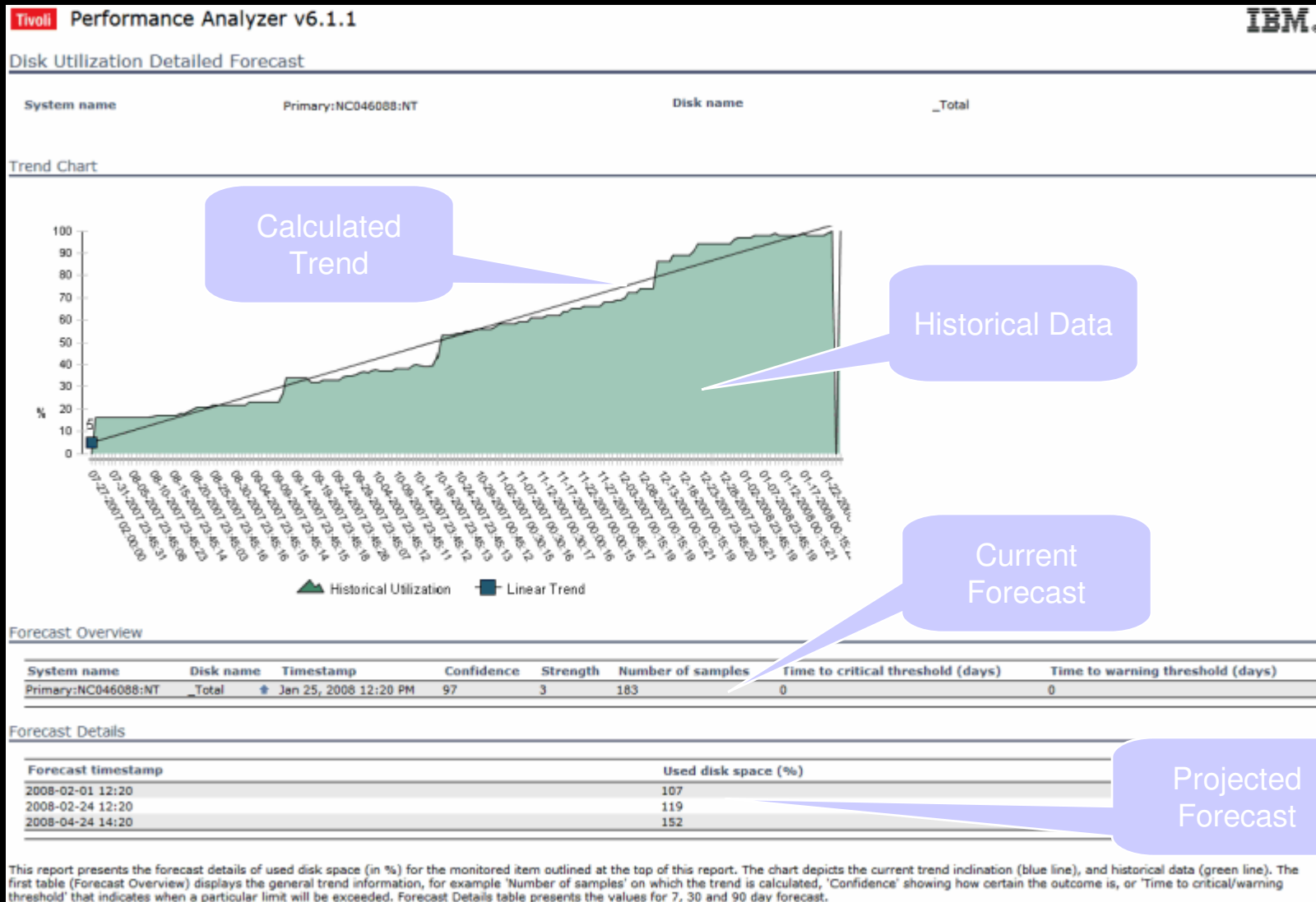
Client & Application Response Time Reports

- Client Availability & Performance Reports
 - Compare real end user Clients, Branch Offices
 - Understand Client usage patterns

- Application & Transaction Availability & Performance Reports
 - Compare performance across web servers



Tivoli Common Reporting - Forecast report layout – OS Disk Utilization - example



IBM Tivoli Monitoring - Control

Alerting through Situations



Tivoli Data Warehouse
and Situations

Situations allow operators to quickly define, distribute and take a reflex action to a set of defined conditions in any monitored resource

- Pre-defined **out-of-the-box** situations provide immediate return on investment and fast time to value
- **Extended** situations reduce false alerts and raise confidence of operators that alerts are real
- Easy **distribution** to a set of targets
- **Expert Advice** imbeds run book automation
- **Tight integration** into root cause analysis and correlation tools improve mean time to recovery

The screenshot shows the 'Situation Editor' window. On the left is a tree view of various system metrics and warnings, with 'NT_Process_CPU_Warning' selected. The right pane shows the configuration for this situation:

Description: Percent of processor time used by this process.

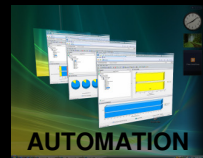
Formula:

	% Processor Time	% Processor Time	Priority Base	Process Name
1	>= 50	< 65	!= 0	!= _Total
2				

Below the table, there is a 'Situation Formula Capacity' indicator showing 18% usage. The 'Sampling interval' is set to 0 / 0 : 15 : 0 (ddh:mm:ss). The 'Run at startup' checkbox is checked.

IBM Tivoli Monitoring - Automation

Capture and Replay Best Practices by Take Action



Take Action and
Workflows

Take Action allows for entry of individual commands and either manual or automated processes to be executed in response to an individual situation

- **Out-of-the-box** take actions provide immediate return on investment and fast time to value
- **Reflex Action** allows the return of a server to a specified state even though disconnected
- **Personalized** take actions can capture a local best practice for unique situations and execute it preemptively
- **User-defined** text can also imbed knowledge that may be unique to a particular situation

Create New Action

Action Identity

Name

Description

Monitored Application: Windows OS

Action Command

Type: System Command

Command

OK

Select Action

<Create new Action>

Start Service

Stop Service

OK Cancel

Summary

- Optimizing the performance & availability of IT is best done in the context of the customer
 - With limited IT budget and resources, focus on performance problems that directly impact the customer and revenue
- It is very difficult to identify and resolve customer performance & availability issues across complex IT applications and infrastructures without the right tools
- IBM Tivoli business service management solutions has the breadth and depth of capability to optimize IT
 - Decrease total cost of IT
 - Increase application availability
 - Increase customer satisfaction
 - Increase revenue

Learn More

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Questions?