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Top 10 Problem Solving Scenarios Using IBM OMEGAMON and the Tivoli Enterprise Portal

Ed Woods
IBM Corporation

Questions

- Are you getting the most from your investment in System z hardware and z/OS software?
- Are you able to recognize and resolve issues efficiently?
- Are you able to maximize the performance and availability of you critical business applications?
- What are the most common issues and how can OMEGAMON address them?

Common Resources To Consider

- **Operating System**
  - LPARs, CPU, Memory, Address Spaces, DASD, Enqueues
- **Transactions**
  - Subsystems, Regions, Tasks, Transactions, Programs, Messages, Queues, Files, Pools, Buffers, Logging
- **Databases**
  - Subsystems, Files, Database Objects, Calls, Threads, Connections, Virtual Pools, Logging, Locking
- **Network**
  - Network Address Space, Applications, Connections, Interfaces

Scenario #1 - z/OS Operating System
Analyzing z/OS High CPU Usage Issues – Real Time

System CPU utilization

Product provided OMEGAMON z/OS workspaces show overall system CPU utilization, and CPU utilization by address space.

Address space utilization

Scenario #1 - Analyzing z/OS High CPU
A Custom Workspace For CPU Analysis

Plot System CPU over time

Create a custom workspace that shows both overall system and address space utilization

Show address spaces using CPU (versus all tasks)

Consider a custom query

Take Advantage Of Custom Queries To Optimize The Display Of Information

Exploit queries to optimize workspace performance

Use "Create Another" to make copies of product provided queries

Click "Query"

Right click "Properties"

Select query from list

Custom query requests address spaces using CPU

Identify Looping Tasks - Address Space CPU Loop Index

Address Space Bottlenecks Summary - IBM-E9503533F87 - SYSADMIN *ADMIN MODE*

File Edit View Help

Navigator

View: Physical

- MVS Operating System
  - LPAR400J:SP22:MVSSYS
    - Address Space Overview
    - Channel Path Activity
    - Common Storage
    - Cryptographic Coprocessors
    - DASD MVS
    - DASD MVS Devices
    - Enclave Information
    - Enqueue, Reserve, and Lock Summary
    - LPAR Clusters
    - Operator Alerts
    - Page Dataset Activity
    - Real Storage
    - System CPU Utilization
    - System Paging Activity
    - Tape Drives
    - User Response Time
    - WLM Service Class Resources
    - z/OS UNIX System Services Overview

Physical

Selected Execution States

Page: 1 of 2

Legend:
- Using CPU
- Using IFA
- Using zIIP
- CPU Wait
- IFA Wait
- zIIP Wait
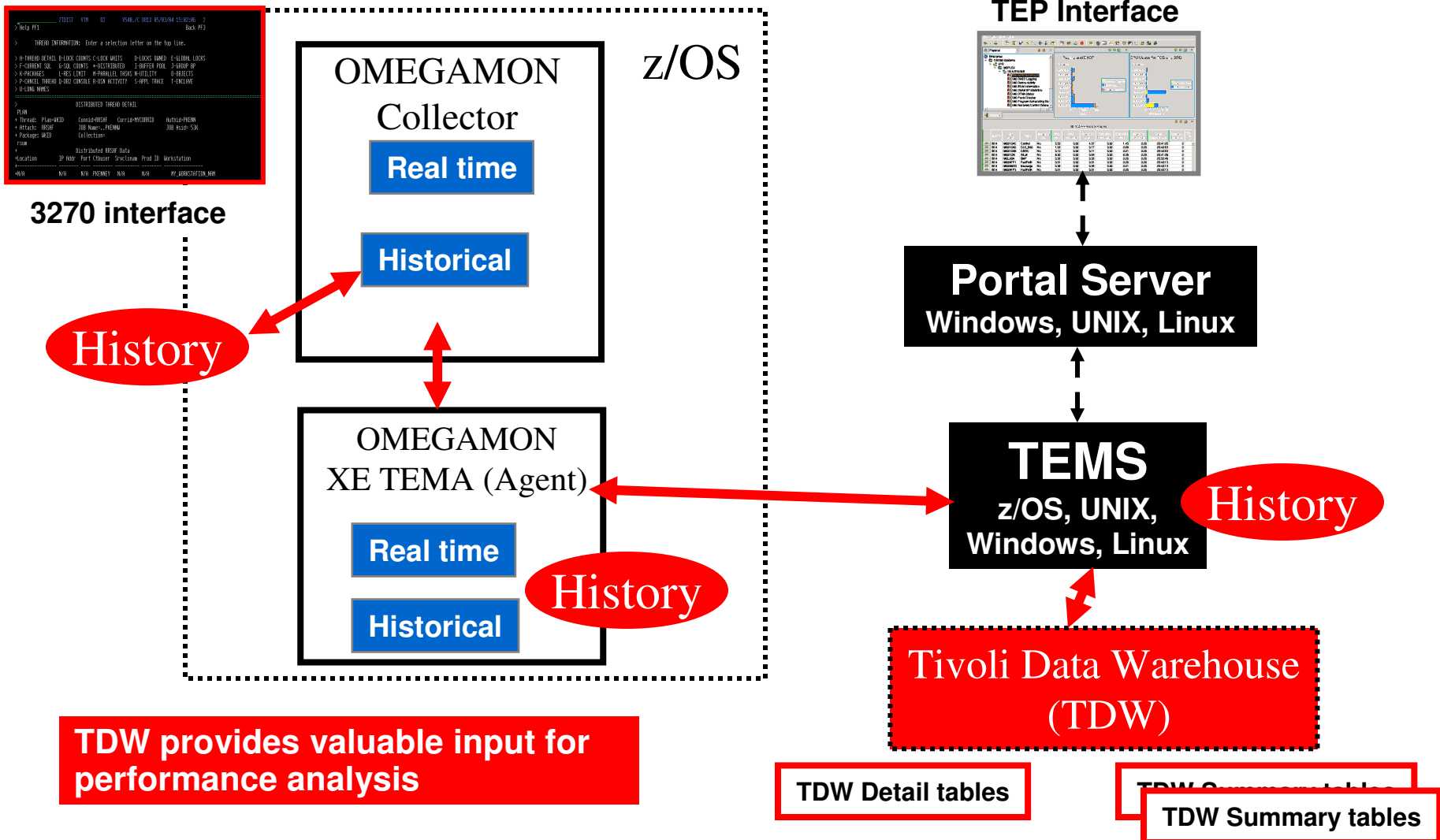- Active I/O
- Queued I/O
- CPU Loop Index

OMEGAMON XE For z/OS 4.20 added a "looping task" indicator. This attribute can be used to aid in identifying tasks that may be looping, and wasting CPU resources.

Address Space Bottlenecks Summary - Contention (%) by Resource

Page: 1 of 2

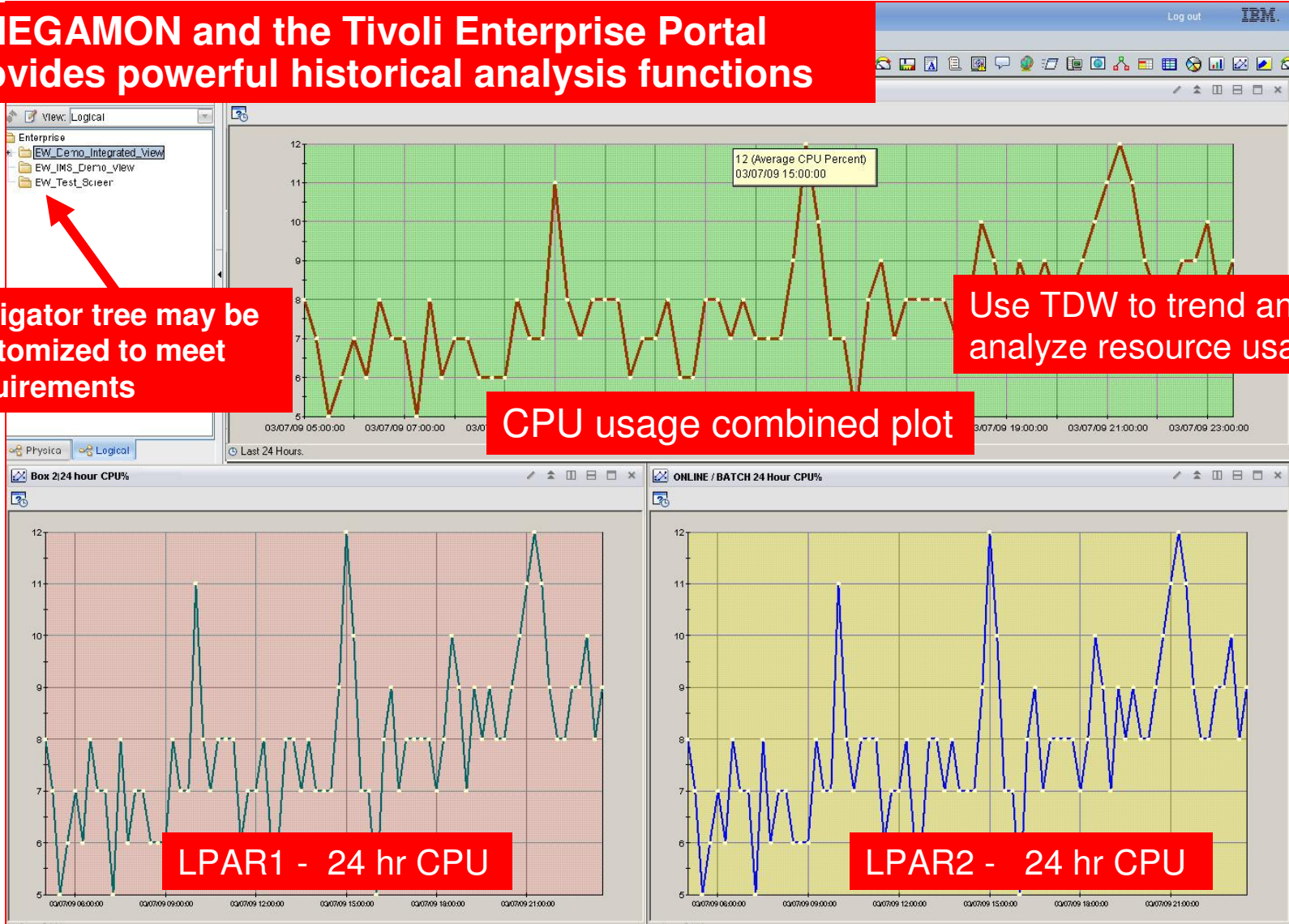| ASID	Job Name	Step Name	Proc Step	Type	Service Class	Period	Using CPU	Using IFA	Using zIIP	CPU Wait	IFA Wait	zIIP Wait	CPU Loop Index	Active I/O	Queued I/O	Enqueue Wait	Tape Mount	Resource Group Capping	Paging Wait	Serv Wai
0X001D	SSANTCP1	RUNMIGS		Batch	BATCH	2	86.1	0.0	0.0	13.8	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0X0028	VTAM36	VTAM	VTAM36	STC	SYSSTC	1	4.0	0.0	0.0	0.4	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0
0X00E6	$X4SDSST	$X4SDSST	TEMS	STC	STCPROD	1	3.6	0.0	0.0	0.8	0.0	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0
0X0006	XCFAS	XCFAS	IEFPROC	STC	SYSTEM	1	3.2	0.0	0.0	0.4	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	0.0	0
0X0007	GRS	GRS		STC	SYSTEM	1	2.4	0.0	0.0	0.4	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0
0X00D4	M5GBHUB1	M5GBHUB1	TEMS	STC	STC	2	1.6	0.0	0.0	0.4	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0
0X00E3	$BWBSRVR	$BWBSRVR	SCLMDTW	STC	STCPROD	1	1.2	0.0	0.0	0.4	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0
0X000B	WLM	WLM	I																0.0	0
0X00D2	MQRGMSTR	MQRGMSTR	P																0.0	0
0X00DE	L3IAMQW9	L3IAMQW9	AGENT	STC	STC	2	0.8	0.0	0.0	0.4	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0

Situation alerts with "Take Action" may be created using this function.

Scenario #2 – Analyzing CPU Usage
Using Tivoli Data Warehouse To Isolate Problems

TEP Interface

3270 interface

z/OS

OMEGAMON
Collector

Real time

Historical

History

Portal Server
Windows, UNIX, Linux

OMEGAMON
XE TEMA (Agent)

Real time

Historical

History

TEMS
z/OS, UNIX,
Windows, Linux

History

Tivoli Data Warehouse
(TDW)

**TDW provides valuable input for
performance analysis**

TDW Detail tables

~~TDW Summary tables~~

TDW Summary tables

Scenario 2 – Analyzing CPU Usage - Historical

OMEGAMON and the Tivoli Enterprise Portal provides powerful historical analysis functions

Navigator tree may be customized to meet requirements

Use TDW to trend and analyze resource usage

CPU usage combined plot

LPAR1 - 24 hr CPU

LPAR2 -   24 hr CPU

Scenario #3 – Isolating DB2 Performance Bottlenecks
DB2 Threads Analysis

DB2 threads are a common starting place for DB2 performance analysis. Common things to look for include:
Threads with high "In-DB2" time
Threads with high Getpage counts
Threads with high wait times (lock/latch, I/O, other)

Navigation push-buttons

Product provided DB2 Thread workspace provides an easy to sort and view overview of threads.
Move columns, click on column header to sort.

DB2 Thread Analysis
Creating A Custom Thread Analysis Workspace

Create a custom DB2 thread workspace to speed thread analysis. View threads by various categories on the same screen.

Distributed

CICS/IMS online

Batch

High Getpage

All Threads

High "In-DB2"

High Getpage

Use a custom query or workspace options to filter and sort

Creating A Custom Thread Analysis Workspace - Continued

Start with the product provided workspace, and customize to the needs of the environment workload.

Do "Save As" to save the workspace to the portal server.

Right click "Properties"

Click column headers to control content

Scenario #4 – Isolating CICS Performance Issues
CICS Task Analysis

Tasks running within a given CICS region are a common starting point for CICS performance analysis

Drill downs for additional detail. Dynamic links to navigate to other tools within the TEP.

Transaction Analysis - ITMDVD24 - SYSADMIN

File   Edit   View   Help

- Units of Work
- Online Data Viewing
- Transaction Details
- Storage Use
- Timings
- Statistics
- Transaction and Program Definition
- Umbrella Information
- Remote Information
- Transaction File Details
- Transaction TSQueue Details
- DB2: Detailed Thread Exception
- IMS: DBCTL Thread Detail (CICS)
- DB2: Single DB2 Thread Summary
- Transaction Details in 3270
- Online Data Viewing in 3270
- Link Wizard...
- Link Anchor...

Navigator

Physical

Transaction Processor Utilization

Transaction Analysis

	System ID	CICS Region Name	CICS SYSIDNT	Transaction ID	Task State	Task Number	CPU Time	Elapsed Time	Resource Type	Resource Name	Wait Type	User ID	Terminal ID	Program ID	E:
	SP22	CICSSPG1	SPG1	CSOL	Suspend	00003	00:00:00.01	00:02:48.52	SODOMAIN	SO_NOWOR	Socket	n/a	n/a	DFHSOL	N
	SP22	CICSSPG1	SPG1	CSSY	Suspend	00005	00:00:00	00:02:48.5	ICMIDNTE	DFHAPTIM	Interval	n/a	n/a	DFHAPATT	N
	SP22	CICSSPG1	SPG1	CSSY	Suspend	00006	00:00:00.01	00:02:48.5	ICEXPIRY	DFHAPTIX	Interval	n/a	n/a	DFHAPATT	N
	SP22	CICSSPG1	SPG1	CSTP	Suspend	00008	00:00:00.3	00:02:48.5	TCP_NORM	DFHZDSP	Terminal	n/a	n/a	DFHZCSTP	N
	SP22	CICSSPG1	SPG1	CSNC	Suspend	00019	00:00:00	00:02:48.45	CSNC	MROQUEUE	MRO	n/a	n/a	DFHCRNP	N
	SP22	CICSSPG1													
	SP22	CICSSPG1													

"Transaction Analysis" workspace will show task info, task state, elapsed time, CPU time, resource being accessed, and current wait reason for the task.
Use to determine if the task is processing or waiting, and if waiting what is the reason.

Isolating CICS Performance Issues
CICS Task Analysis And Region Analysis With A Custom Workspace

CICS region overview (use a custom query) to be able to see CICS activity cross region.

Add a link to navigate cross-region.

Create a custom CICS workspace to view CICS region and CICS task activity from a consolidated view.

Transaction overview for a given CICS region.

Scenario #5 – Isolate IMS Bottlenecks
Analyze IMS Queues And Processing

Product Provided IMS Health workspace focuses on many key rate metrics

Understanding and analyzing IMS processing rates and queue activity is key to managing IMS performance.

Enqueue/dequeue rates

CPU rates

Tran queue & tran rate

IMS Historical Performance Analysis Custom Workspace

Plot chart analysis of key IMS performance metrics

Plot charts of history by time interval. Use for trend analysis.

Transactions by status

IMS Bottlenecks

Response time and processing rate

Enqueue/dequeue rates
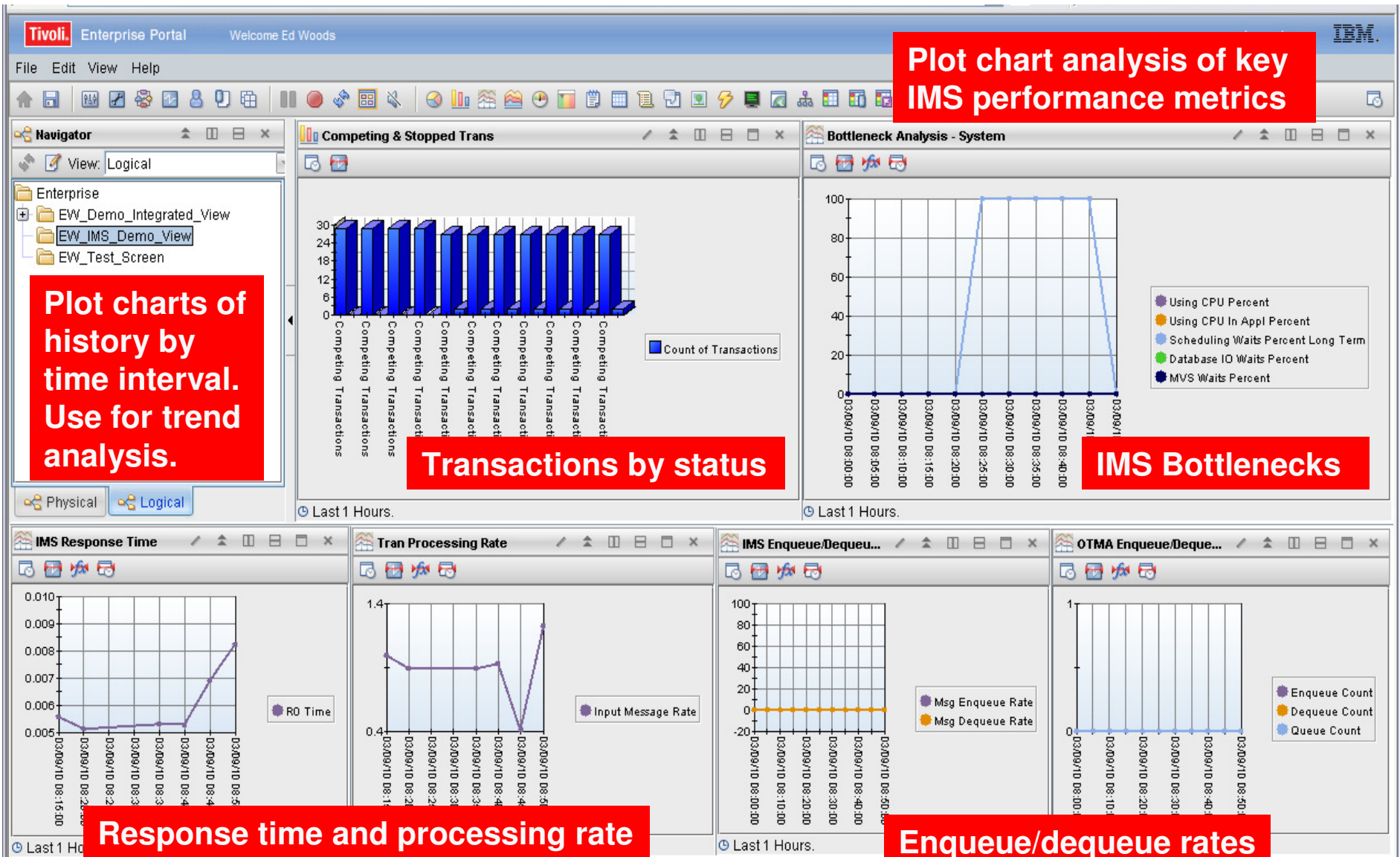
The TEP Provides Powerful Chart Functions And Statistical Analysis Features

Baseline analysis and arithmetic functions

Area plot charts provide a different perspective of history

Example – Area Plot Chart Of IMS Response Time With Statistical Baseline

Analyze IMS response time in the context of historical trends and averages
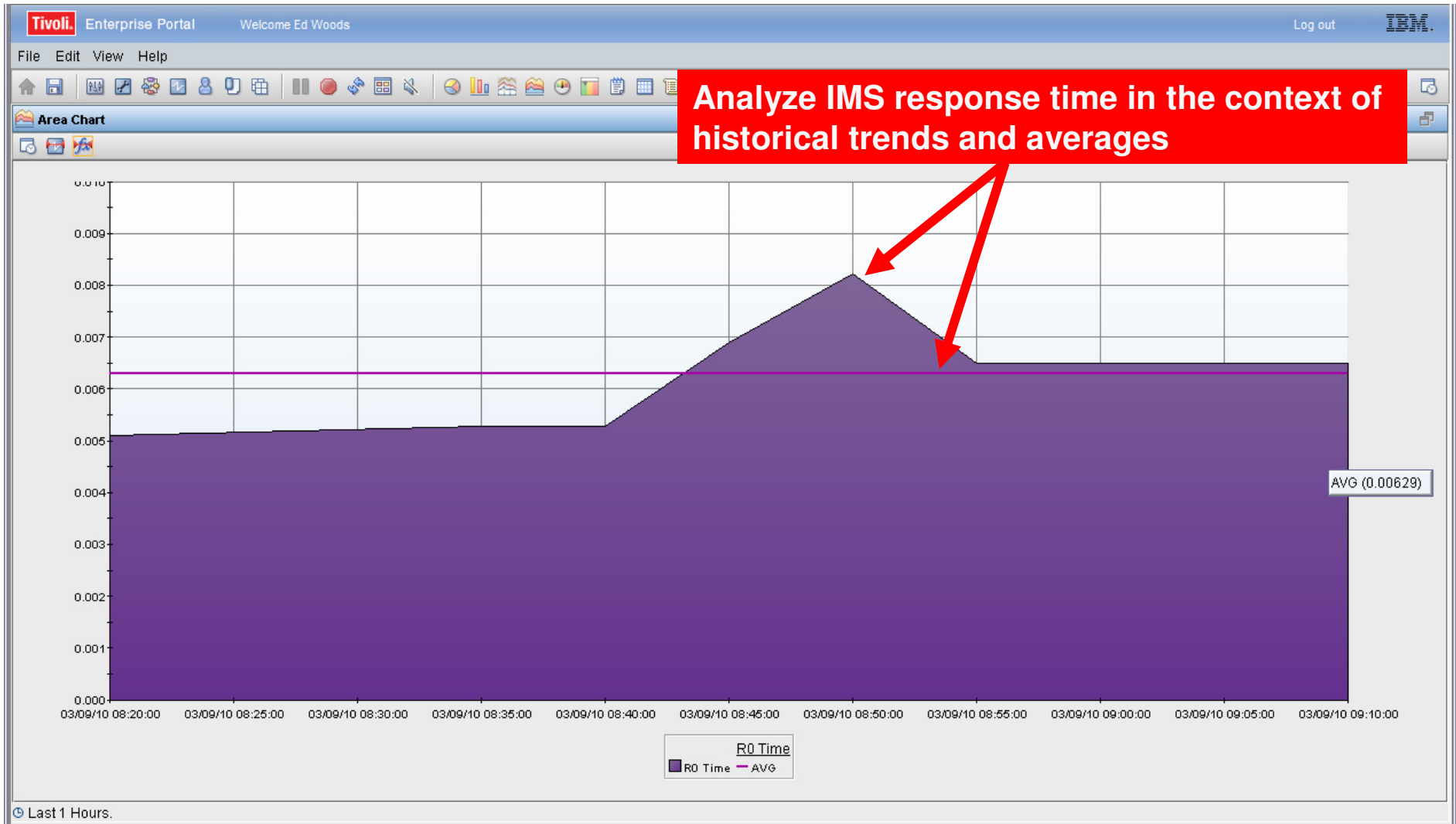
Scenario #6 – WebSphere MQ
Isolate MQ Performance Issues

When looking at WebSphere MQ issues typical starting points are Queue Statistics (Queue status and queue depth), and Channel Performance (Channel status and activity).

Click on column header to sort by queue depth

Look at queue depth and Msg put and read rate

Queue Statistics for Monitored Queues with Messages

Queue Name	Queue Usage	Definition Type	Total Opens	Input Opens	Output Opens	Curren Depth	Msgs Put per Sec	Msgs Read per Sec	High Depth Threshold	Highest Depth	% Full	Ret Intvl Exceeded	Get Status	Put Status	Cur Opened Exclusive	D
WSQM	XmitQ	Predefined	0	0	0	448650	0.0	0.0	80	0	0.0	No	Disa...	Ena...	n/a	Y
DEMO00.QREP.DATAQ	Normal	Predefined	0	0	0	154343	0.0	0.0	80	0	0.0	No	Ena...	Ena...	n/a	Y
TGT_QM_ZL	XmitQ	Predefined	0	0	0	75578	0.0	0.0	80	0	0.0	No	Ena...	Ena...	n/a	Y

Use Situations To Alert On MQ Queue Depth

Monitor and alert on MQ queue depth to indicate potential bottlenecks

Click to get details on the situation alert

A Situation To Monitor MQ Queue Depth

The various tabs control where the situation logic runs, and if the situation takes an action, or sends an alert via the EIF interface

Right click and select "Situations"

Boolean logic can be used to monitor for multiple scenarios within a single situation

Scenario #7 – Network Performance And Availability Understanding The Impact Of The Network On z/OS

By integrating information from OMEGAMON Mainframe Networks with information from the other OMEGAMONs, you can get a better understanding of the network impact on the workload

Alert graphic view

DB2 Distributed threads

CICS Response time

DB2 network

CICS network

IMS Response time

IMS network

Alerts

Actions

Exploit Queries To Optimize The Display

"Created another" query and filtered for DB2 distributed (DSNADIST)

Scenario #8 - Storage
Storage – Understanding I/O bottlenecks

- **I/O potentially impacts many types of workload on z/OS**
  - DB2, IMS, CICS, MQ, WebSphere and much more…..
  - CPUs are **FAST**, I/O is ***SSLLOOWW…………….***

- **OMEGAMON provides I/O information in several areas**
  - OMEGAMON XE For z/OS – I/O by Volser, I/O for tasks, Paging I/O
  - OMEGAMON XE For DB2 – I/O by DB2 object and volser, Logging I/O
  - OMEGAMON XE For CICS – VSAM I/O (LSR stats), task and region delays
  - OMEGAMON XE For IMS – IMS DB I/O, IMS MSG Q data set I/O, IMS log I/O
  - OMEGAMON XE For Mainframe Networks – FTP activity
  - OMEGAMON XE For Messaging – Queues, buffers, logging

- **OMEGAMON XE For Storage provides the most robust analysis of storage and I/O on z/OS**
  - LCU, Control Unit, Volser, dataset level
  - Virtual tape, Cache control unit (including control unit internal info)
  - SMS and HSM monitoring analysis
  - User defined I/O and space groups, Application I/O and space groups

Storage – Understanding I/O Bottlenecks

OMEGAMON Storage provides detailed I/O bottleneck analysis via drill down capability

Use the capabilities of the TEP to sort and filter the display

Storage – Understanding I/O Bottlenecks From The Application Perspective

It's important to understand the impact of I/O on the application. OMEGAMON Storage provides powerful application level I/O and space monitoring capabilities.

"Application Summary" allows the user to target specific workloads for I/O and space monitoring

Monitor the application, then drill down for additional detail. Go from Volser down to dataset level detail.

Scenario #9 – Situation Alert Notification Versus Highlighting Thresholds To Identify Issues

Situations versus highlighting thresholds

Use situations to indicate/notify important events/issues

Use highlighting in the TEP for informational purposes

A situation requires coding and distribution, and will typically be more overhead than threshold highlighting.

Highlighting thresholds is for fine for informational, but will not drive an action or notification (beyond what is on the screen).

Situations may be used to indicate events and notify about problems. Situations may be used to indicate performance, resource, or availability issues.

Using The Threshold Function For Informational Highlighting

The Threshold function works well to highlight information for easy to see eyecatchers

Highlight BP hit ratio for informational purposes

From "Properties" select the "Threshold" tab.

Specify thresholds and highlighting level (Critical, Warning, etc).

Using Situations To Drive Event Notification

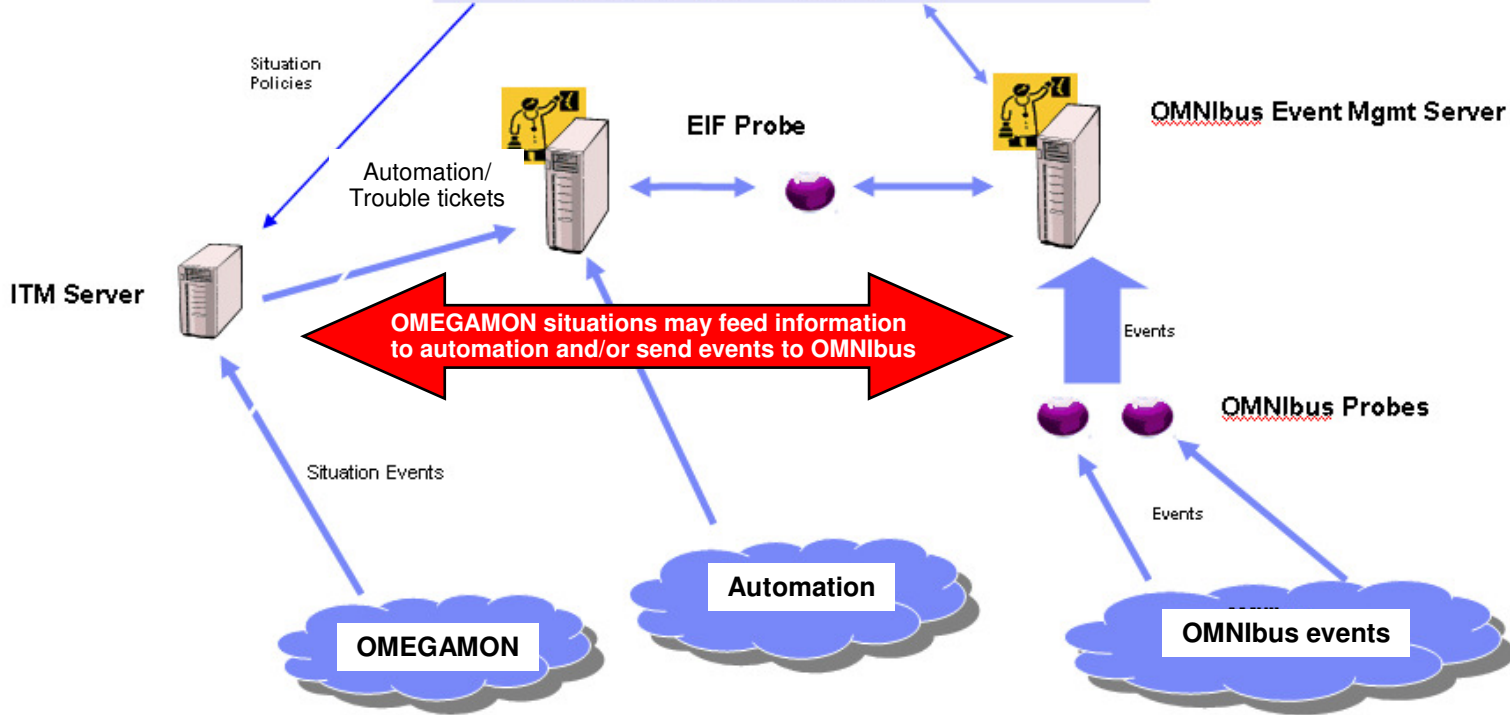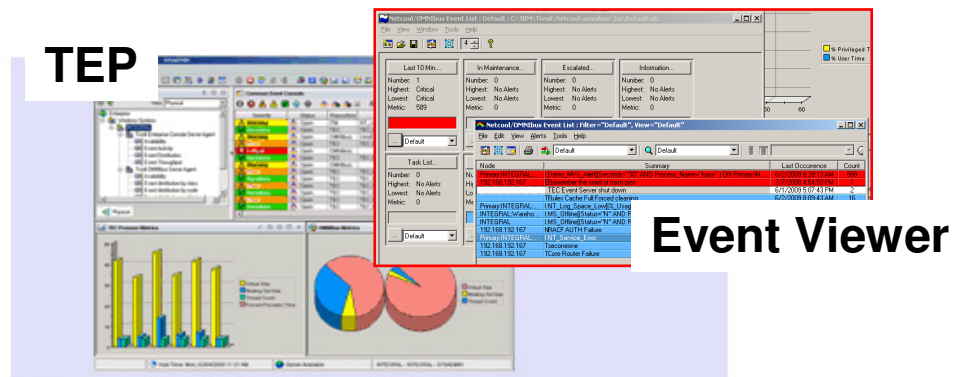**Situation editor to specify situation logic.**

Use "Action" to have the situation issue a corrective command.

Use "EIF" to have the situation send the event to OMNIBus.

Using the EIF interface may be more efficient than using the "Action" tab on the situation editor.

Use The EIF Interface To Send Events To OMNIBus

OMNIBus Integration enables customer to forward events reported by OMEGAMON XE monitoring agents . The interface is bi-directional.

TEP

Event Viewer

Situation Policies

EIF Probe

OMNIbus Event Mgmt Server

Automation/
Trouble tickets

ITM Server

OMEGAMON situations may feed information to automation and/or send events to OMNIbus

Events

OMNIbus Probes

Situation Events

Events

Automation

OMEGAMON

OMNIbus events

Situations And Alerts Versus Threshold Highlighting

- **Not all information requires an alert**
  - In general alerts imply some type of event that requires an action to address
- **Some information needs to be highlighted for informational purposes, but does not require an action**
  - Nice to know, but does not require immediate intervention
- **Use situation alerts for events or information that**
  - Requires additional analysis or immediate action
  - Requires some form of corrective action
  - Has an "owner" responsible for addressing an issue
- **Consider threshold highlighting for**
  - Information that is of diagnostic interest
  - Information that is useful for analysis and may indicate a potential issue, but does not require immediate action
- **For informational purposes threshold highlighting will be more efficient than coding, creating, distributing, and executing a situation**

Scenario #10 – A Dashboard To Provide An Integrated Problem Management Paradigm

- Use the graphics and integration capabilities of the Tivoli Enterprise Portal to provided custom dashboard views targeted for specific audiences
  - Technical views, Operational views, Alert management views, SME views, End to end business application views, Management by exception views

Integrated Technical View Using The TEP

An integrated view of some of the most commonly referenced performance information

Custom navigation allows you to target the most important information

z/OS system and address space CPU

DB2 Threads

CICS Tasks

DASD I/O bottlenecks

Network

Alerts

Tivoli. Enterprise Portal   Welcome Ed Woods   Log out   IBM.

File   Edit   View   Help

Navigator
View: Logical
Enterprise
- EW_Demo_Integrated_View
  - EW_IMS_Demo_View
  - EW_Test_Screen

Physical   Logical

High System CPU

Managed System	Average CPU Percent	RMF MVS CPU Percent	RM CP
DEMOPLX:MVSA:MVSSYS	4	6.2	6.3

High CP

Job Name	Step Name	CPU Percent	Proc Step	SvcClass
DDS06661	IQ	18.7	STEP1	BATMED

Network Issues

Origin Node	Application Name	Connections in Backlog	Total Segments Retransmitter
TCPIP:MVSA	ADHSRV	8	

DB2 Threads

MVS ID	DB2 Subsystem	In DB2 CP CPU Time	In DB2 Time	Plan	A
MVSA	DSNC	00:00:00.009	00:00:00.014	PSADPLAN	D
MVSA	DSNC	00:00:00.302	00:00:04.662	KO2PLAN	D
MVSA	DSNC		2.592	KO2PLAN	D
MVSA	DSNC		2.611	KO2PLAN	D
MVSA	DSNC	01:00:49.504	01:14:21.903	DB2PM	

CICS Tasks

System ID	CICS Region Name	CICS SYSIDNT	Transaction ID	User ID	Terminal ID	Ta Nur
MVSA	CICSAOR1	C22A	OSEC	SYSSTC	n/a	000
MVSA	CICSAOR1			6STC	n/a	000
MVSA	CICSAOR1			6STC	n/a	000

DASD High MSR Time

Managed System	Address	Volume	Response	Storage Group	I/O Rate	Cache Status	Percent Reserve

Situation Event Console

(Active)   Total Events

Severity	Status	Owner		isplay Item	Source	Impact	Opened

Take Action

Take Action

Action

Hub Time: Thu, 07/01/2010 11:33 PM   Server Available   EW_Demo_Integrated_View - dem17lnx.democentral.ibm.com - Ed Woods

Dashboard Alternatives – TEP Versus TBSM

- **Use Tivoli Enterprise Portal to establish the premise of a Management Dashboard**
  - Powerful and flexible graphics and integration capabilities of the Tivoli Enterprise Portal enable the creation of targeted dashboards
  - Use the TEP to establish the concept of an integrated management dashboard in your shop

OMEGAMON DE, OMEGAMON XE, & ITCAM

- **Look at TBSM to grow and expand the notion of dashboards and business application management**
  - Components like TADDM can analyze application dependencies
  - TBSM shows SLAs
  - Event correlation via OMNIBus
  - Expandable and scalable for large enterprises

Tivoli Business Service Manager (TBSM)

Summary

- The Tivoli Enterprise Portal provides a powerful and flexible integrated capability to identify and manage common performance and availability challenges
- The Tivoli Enterprise Portal enables you able to recognize and resolve issues efficiently
- The Tivoli Enterprise Portal allows you to target the most common issues and ensure that you are getting the most from your investment in System z hardware and z/OS software
- By building dashboards you can use the Tivoli Enterprise Portal as a way to begin the process end to end business application management

Check Out My Blog
http://tivoliwithaz.blogspot.com

Thank You!