



IBM Software Group

# OMEGAMON XE For DB2

## Usage Strategies And Best Practices

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 Tivoli software

A decorative horizontal bar at the bottom of the slide features a series of colored squares (red, purple, cyan, green, yellow) followed by a white asterisk, a woman's face, a grid of four white circles, and other abstract patterns.

@business on demand.

# OMEGAMON Management Triangle

**OMEGAMON DE – Dashboard Edition**

High level monitoring  
Multi-system view  
Cross Platform View

Performance  
Triangle

**3270 Interface**

**OMEGAMON XE**

Subsystem details  
3270 Interface  
Historical details

Subsystem level monitoring  
Browser And GUI interface  
Proactive Alerting & Automation



# OMEGAMON DB2 Options & Interfaces

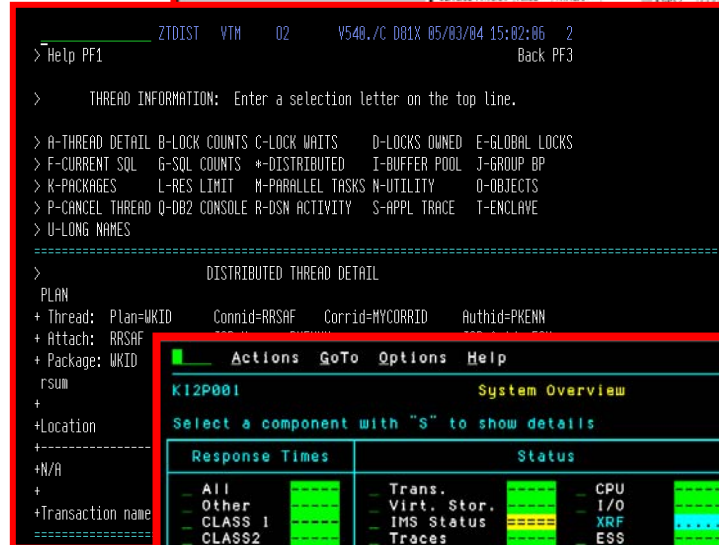
## OMEGAMON XE GUI Interface

- ▶ Java client or web browser – Tivoli Portal
- ▶ Real time and historical
- ▶ Automation & alerts – Situations & Policies
- ▶ Plex level information (CF, n-way)



## OMEGAMON Classic

- ▶ 3270 Interface command interface
- ▶ Real Time & Historical
- ▶ Major & Minor commands
- ▶ Exceptions stored in classic profile



## OMEGAMON CUA

- ▶ 3270 interface
- ▶ Different views from Classic
- ▶ Real Time & Historical
- ▶ Warning & Critical exception alerts



## OMEGAMON XE For DB2 UDB On z/OS

### Major Features & Components

#### Real Time Thread Analysis

- ✓ Thread performance (elapsed, CPU, getpage info)
- ✓ Thread Detail (lock detail, SQL detail, plan & package level)
- ✓ Triggers, Procedures, & UDFs

#### Real Time – DB2 subsystem

- ✓ Virtual Pool & EDM Pool analysis
  - ✓ Pool performance
  - ✓ Pool snapshot detail
- ✓ Locking & Logging

#### Application Trace Facility

- ✓ Detailed performance tracing

#### Choice Of Interfaces (XE

Interface, 3270 Classic & CUA)

#### Object Analysis

- ✓ I/O & getpage analysis
- ✓ Correlate activity by object & applications

#### Lock Conflicts

#### Near-Term Historical

- ✓ Near-term history online

#### Historical Analysis

- ✓ Batch reporting from VSAM, DB2 or SMF
- ✓ XE Historical analysis

#### ✓ DB2Plex Monitoring View

- ✓ View CF structures
- ✓ Global lock analysis

#### Automation capabilities



## OMEGAMON XE For DB2 UDB On z/OS Major Features & Components

*QM9 = Available in QM9*  
*3270 = Available in 3270*

### Real Time Thread Analysis

- ✓ Thread performance (elapsed, CPU, getpage info) *QM9 & 3270*
- ✓ Thread Detail (lock detail, SQL detail, plan & package level *3270*)
- ✓ Triggers, Procedures, & UDFs

### Real Time – DB2 subsystem

- ✓ Virtual Pool & EDM Pool analysis
- ✓ Pool performance *QM9 & 3270*
- ✓ Pool snapshot detail *3270*
- ✓ Locking & Logging *QM9 & 3270*

### Application Trace Facility *3270*

- ✓ Detailed performance tracing

### Choice Of Interfaces (XE *QM9 & 3270*)

Interface, 3270 Classic & CUA)

### Object Analysis *QM9 & 3270*

- ✓ I/O & getpage analysis
- ✓ Correlate activity by object & applications

### Lock Conflicts *QM9 & 3270*

### Near-Term Historical *3270*

- ✓ Near-term history online

### Historical Analysis

- ✓ Batch reporting from VSAM, DB2 or SMF *3270*
- ✓ XE Historical analysis *QM9*

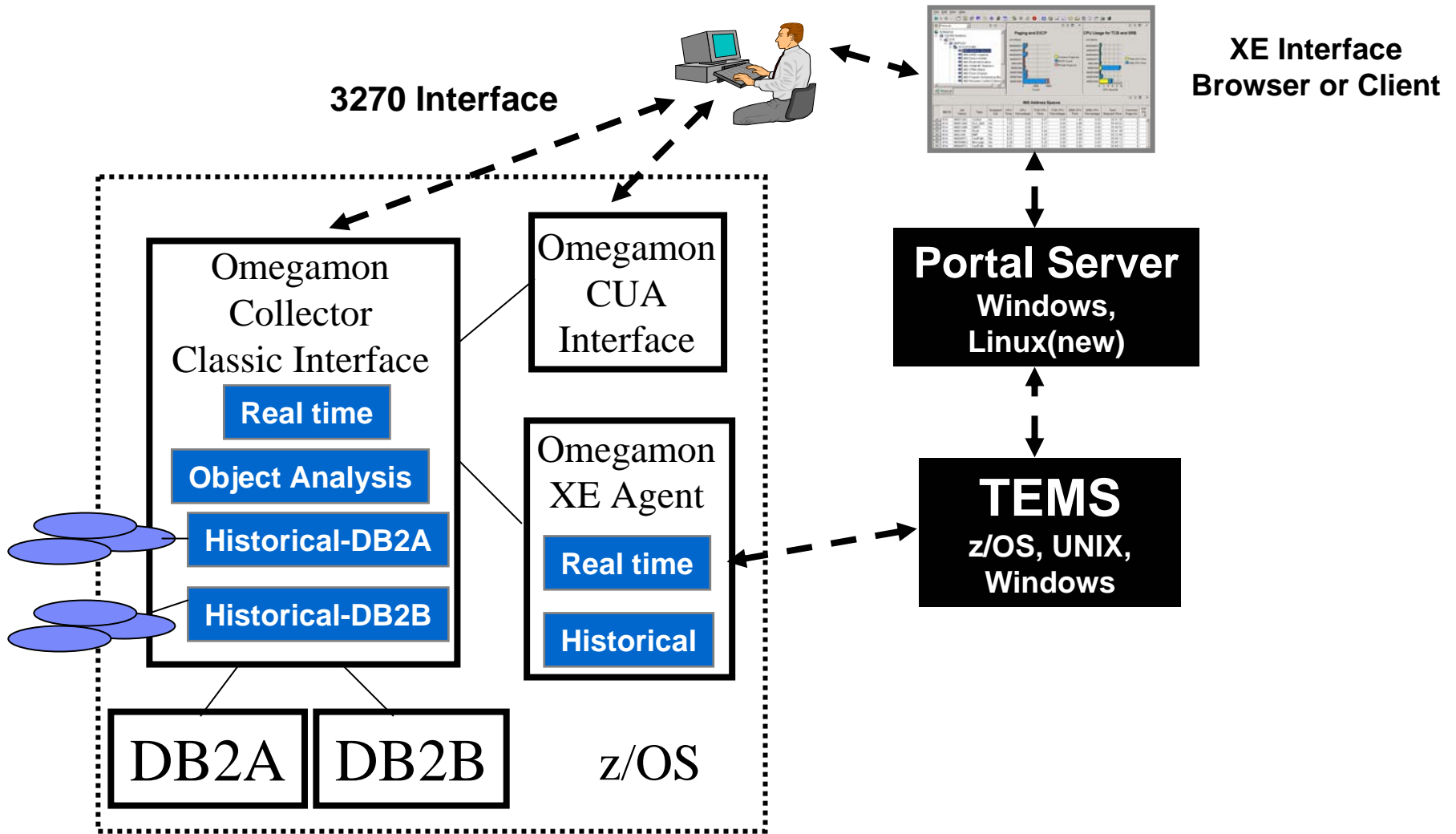
### ✓ DB2Plex Monitoring View

- ✓ View CF structures *QM9*
- ✓ Global lock analysis

### Automation capabilities *QM9*



# OMEGAMON XE For DB2 Components And Architecture



# Omegamon DB2 XE GUI Interface versus 3270 – When To Use

- XE GUI Interface strengths and capabilities
  - ▶ Customizable high level overview of all DB2 activity
    - Thread activity and subsystem activity
  - ▶ Data sharing performance information (CF structures, global lock analysis)
  - ▶ Customizable alerts, automation, and corrective actions
- 3270 (Classic & CUA) Interface strengths and capabilities
  - ▶ Thread activity detailed analysis
    - Thread detail, timings, detail SQL activity, lock detail and activity
  - ▶ Subsystem activity detail
    - Virtual Pool and EDM Pool snapshot and detailed analysis
  - ▶ Application Trace Facility
  - ▶ Object Analysis (non data-sharing subsystems)
- Historical considerations
  - ▶ Omegamon Near Term History – 3270 Interface
  - ▶ XE GUI Interface snapshot historical



# Omegamon XE GUI Interface

## Integration, Consolidation, Customization, and Flexibility

### DB2 As Part Of A Bigger Picture

**Omegamon DE - 'Dashboard Edition'**

**Systems Management Dashboard Overview**

A digital dashboard allows for key elements to be combined into a single view

The dashboard provides a comprehensive view of system health and performance. It includes several data tables for detailed monitoring:

z/OS Performance			
Service Class	Period	Goal Type	G Perc
BATCH	1	Velocio	
BATCH	2	Velocio	
BATHI		ocio	

CICS Region Overview				
System ID	CICS Region Name	CICS Version	R	S
SP12	CCCD18	6.2.0	N/	
SP12	CCCD19	6.2.0	N/	
SP12		2.0	N/	

IMS Address Spaces		
Originating System Identifier	MVS System	IM
XEIMS:SP12:MVS	SP12	I71
XEIMS:SP12:MVS	SP12	I71

DB2 Threads	
Originnode	
D710:SP12:DB2	02/08

MQ Series	
Origin Node	P
MQ12:SP12:MQESA	04
MQ12:SP12:MQESA	03
MQ	n4

Ready | Hub Time: Tue, 02/08/2005 07:02 PM | Server Available. | Overview - hqdn11.us.ibm.com | EWOOD \*ADMIN MODE



# Event Management & Problem Isolation

**Systems Management Dashboard Overview**

MQ Series, Websphere Status, z/OS Performance, Network Performance, IMS, CICS, CF Status, DB2Plex

**Red icons highlight the problem**

Service Class	Period	Goal Type	G Perc	System ID	CICS Region Name	CICS Version	R S	Originating System Identifier	MVS System	IM	Originnode	Origin Node	P
BATCH	1	Velocio		SP12	CCCD18	6.2.0	N/					MQ12:SP12:MQESA	0:
BATCH	2	Velocio		SP12	CCCD19	6.2.0	N/	XEIMS:SP12:MVS	SP12	I71		MQ12:SP12:MQESA	0:
BATHI	1	Velocio		SP12	CCCD20	6.2.0	N/	XEIMS:SP12:MVS	SP12	I71	D71G:SP12:DB2	02/08	0:

Region Overview | IMS Address Spaces | DB2 Threads | MQ Series

Ready | Hub Time: Tue, 02/08/2005 07:10 PM | Server Available. | Shelter Overview - hqdn1.usca.ibm.com - EWOOD \*ADMIN MODE\*

# Event Management & Problem Isolation

**Alerts driven by a mechanism called a situation  
Situations may be given meaningful names**

**CRITICAL**  
 EW\_MVS\_CPU\_Critical LPAR400J:SP12:MVSSYS 02/08/05 19:10:54

Select workspace link button to view event results.

**z/OS Performance**

Service Class	Period	Goal Type	G Perc
BATCH	1	Velocio	
BATCH	2	Velocio	
BATHI	1	Velocio	

**Recommendations – have a naming standard for situations, make the names meaningful, and use consistent standards for situation intervals and settings**

Ready | Hub Time: Tue, 02/08/2005 07:11 PM | Server Available. | Shelter Overview - hqdn1.usca.ibm.com - EWOOD \*ADMIN MODE\*

# Omegamon XE Situations Enable Detailed Alerts

Situation(s) for - DSNA:MVSA:DB2

Condition

Description

Condition

	DB2 Elapsed Time	Package Name	Authorization Identifier
1	GT 00:01:40.0	abc EQ DISTSERV	
2	GT 00:33:20.0	abc EQ TESTBAT	
3	EQ 00:01:20.0	abc EQ DISTSERV	abc EQ CIO

Authorization Identifier Authid of the thread. Valid entry is an alphanumeric text string, with a maximum length of eight characters.

Cancel Command Command string needed to cancel a thread. Valid entry is an alphanumeric text string, with a maximum length of eight characters.

Sound

State

More detailed alerts mean more meaningful & useful alerts. Requires fewer alerts to be created.

# Performance Automation

## Automated Corrections

- Monitor problem applications on an ongoing basis
  - ▶ Example - Monitor for runaway threads
    - Automate the termination of runaway threads
    - Automated 'kill' capability
- Use intelligent situation logic to target problem applications
- Monitor for subsystem issues and automate corrective actions
- No Rexx code or procedural language required



# Automated Corrections

## Runaway Thread Scenario

Situation(s) for - DSN1:SYS1:DB2

Condition Distribution Expert Advice Action Until

Description

Condition

	Getpage Count	Plan Name
1	GT 1000	abc EQ DSNEE
2		
3		

Click inside a cell of the tabular editor above to see a description of the attribute for that column and to compose the expression.  
Add an attribute to the condition by clicking Add Attributes and selecting the attributes you want to include.

Add attributes... Advanced...

Sampling interval: 0 / 0 : 1 : 0  
dd hh mm ss

Sound:  Enable critical.wav  
Play Edit...

State:  Critical  
 Run at startup

**Create an alert tracking for problem DB2 threads. Click add attributes to add more logic to the check.**

# Automated Corrections

## Specifying The Cancel Command

The screenshot displays the 'Situation(s) for - DSN1:SYS1:DB2' window. The left pane shows a tree view with 'MVS DB2' expanded to 'EW\_Demo\_Runaway\_Thread'. The right pane has tabs for 'Condition', 'Distribution', 'Expert Advice', 'Action', and 'Until'. The 'Action' tab is active, showing 'Action Selection' with 'System Command' selected. The 'System Command' field contains '&DB2\_Thread\_Exceptions.Cancel\_Command'. Below this are options for 'If the condition is true for more than one m...' (Only take action on first item, Take action on each item), 'Where should the Action be executed (per...' (Execute the Action at the Managed System, Execute the Action at the Managing System), and 'If the condition stays true over multiple intervals:' (Don't take action twice in a row, Take action in each interval). A black callout box with white text points to the command field.

**Action tab allows specification of the DB2 Cancel command with the correct token already specified.**

# Monitoring The Problem Thread

The screenshot displays the IBM Tivoli monitoring interface. On the left, a tree view shows the system hierarchy: Enterprise > OS/400 Systems > TIVOM01 > DB2 > DSN1:SYS1:DB2 > Detailed Thread Exception. The main area is split into two panels. The top panel, titled 'Locks Owned', is a 3D bar chart showing the number of locks owned by various authorization IDs (Authid). The x-axis is labeled 'Count' and ranges from 0 to 12000. A prominent purple bar represents Authid P 22 (P390A), which has a count of approximately 10577. A black arrow points from this bar down to the table below. The bottom panel, titled 'Detailed Thread Exceptions', contains a table with the following data:

Package Name	Authorization Identifier	DB2ID	CPU Utilization	Elapsed Time	Getpage Count	Thread Status
DSNESH68	P390A	DSN1	7.2	00:00:22	10577	IN_DB2

Below the table, the system information is displayed: DB2 System: DSN1, MVS System: SYS1. The status bar at the bottom shows 'Ready', 'Hub Time: Mon. 04/04/2005 02:59 PM', 'Server Available.', and 'Detailed Thread Exception - 9.73.235.210 - SYSADMIN \*ADMIN MODE\*'.



# Automated Corrections

## The Cancel Command Is Issued

```

Display Filter View Print Options Help
-----
SDSF SYSLOG      12.101 SYS1 SYS1 04/04/2005 2W   32267      COLUMNS 38 117
COMMAND INPUT ==>          SCROLL ==> CSR
STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG EXCEED MAXIMUM USE COUNT
STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG EXCEED MAXIMUM USE COUNT
STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG EXCEED MAXIMUM USE COUNT
STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG EXCEED MAXIMUM USE COUNT
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STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG EXCEED MAXIMUM USE COUNT
STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG EXCEED MAXIMUM USE COUNT
STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG EXCEED MAXIMUM USE COUNT
STC00625 00000290  - CANCEL THREAD(556)
STC00023 00000090  DSNV426I - DSNVCT THREAD '556' HAS BEEN CANCELED
STC00023 00000090  DSN3201I - ABNORMAL EOT IN PROGRESS FOR USER=P390A 855
      855 00000090  CONNECTION-ID=TSO CORRELATION-ID=P390A JOBNAME=P390A ASID=004
      855 00000090  TCB=008E1798
5 DFS996I *IMS READY* IVP1
3 ISTEXC200 - DYN COMMANDS MAY BE ENTERED
***** BOTTOM OF DATA *****

```

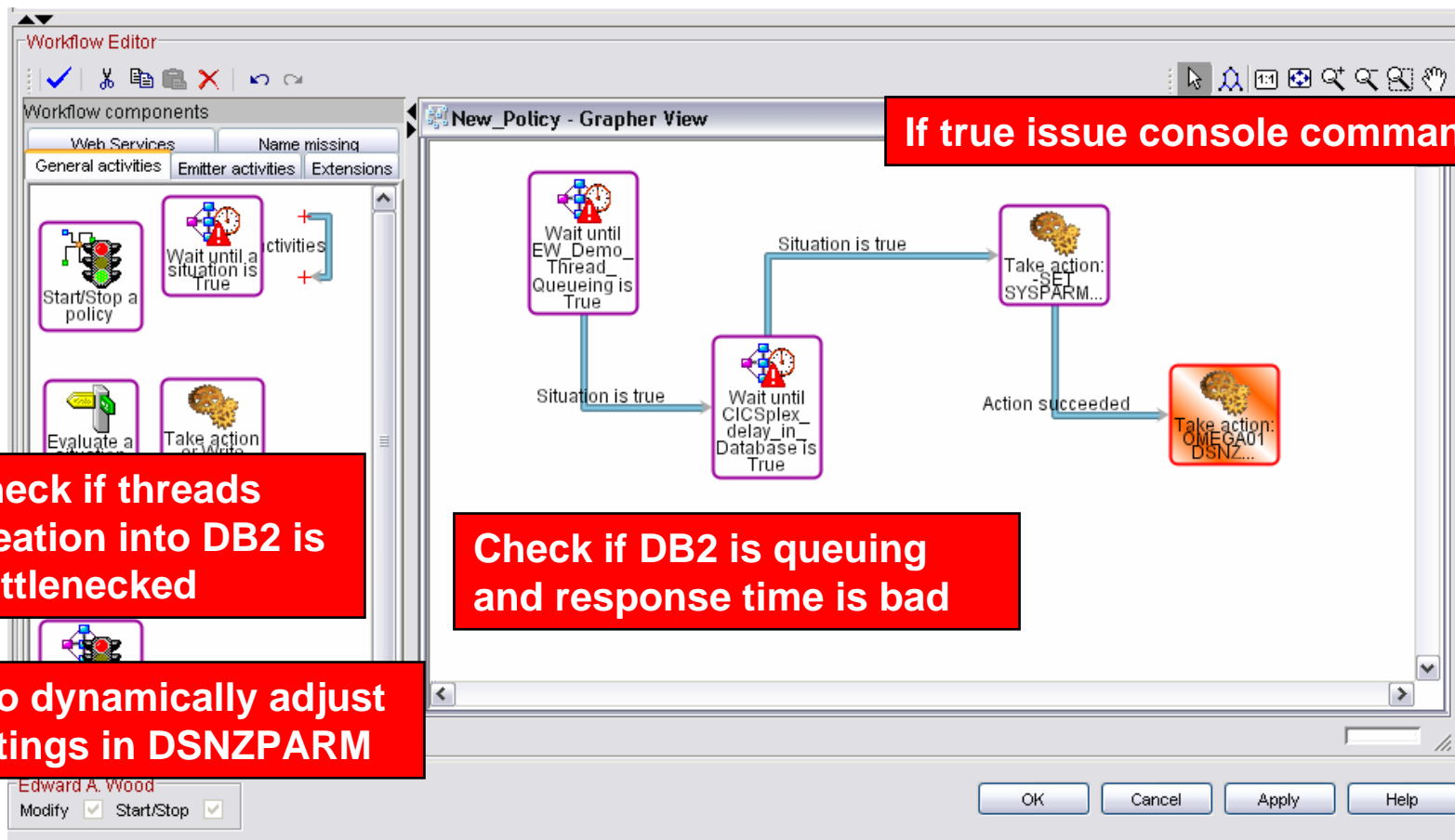


# Performance Automation And Policies

- Use Situations for simpler “fire and forget” type of scenarios
- Use Policies for more sophisticated performance automation scenarios
- Automate corrections at machine speed
  - ▶ Implement machine speed corrective actions, issue alerts, and allow for later human intervention
- Use for dynamic subsystem management and ‘tweaks’ as the workload changes
  - ▶ Not permanent fixes, but to keep the workload running
- Policies allow for correlated automation of composite applications



# Using Policies For Dynamic Performance Management



Check if threads creation into DB2 is bottlenecked

If so dynamically adjust settings in DSNZPARM

Check if DB2 is queuing and response time is bad

If true issue console commands

# Using Policies For Dynamic Performance Management

The screenshot displays the Workflow Editor interface. On the left, the 'Workflow components' pane shows various activity icons, including 'Start/Stop policy', 'Wait until a situation is true', 'Evaluate a situation now', 'Take action or write message', 'Make a choice', 'Suspend execution', and 'Start/Stop a situation'. The main workspace, titled 'New\_Policy - Grapher View', shows a workflow diagram. It starts with a 'Wait until EW\_Demo\_Thread\_Queueing is True' activity, which triggers a 'Take action: -SET SYSPARM...' activity. An 'Action Settings' dialog box is open, showing the 'System Command' option selected and the command '-SET SYSPARM LOAD(DSNZPARM) RELOAD' entered. A second 'Take action: OMEGA01 DSNZ...' activity is also visible in the workflow. A red callout box at the bottom center contains the text: 'Issue SET SYSPARM command to activate new ZPARM settings'. The bottom status bar shows the user 'Edward A. Wood' and checkboxes for 'Modify' and 'Start/Stop'.

**Issue SET SYSPARM command to activate new ZPARM settings**

# Use Omegamon XE GUI To Build Graphic Overviews

**DB2 Data Sharing Overview**

**OMEGAMON XE**

Coupling Facility

Sysplex A DB2A

Sysplex B DB2B

P000 DB21 P100 DB22

P200 DB23 P300 DB24

PRD1 DBB1 PRD2 DBB2

PRD3 DBB3

MVS1 MVS2 CICS Network

Physical Business Overview

Total Events: 1 Item Filter: DB2 C

**Event Console**

Status	Situation Name	Display Item	Source
Open	EW_DB2_CF_Alert		Primary:EDDEM

**Recommendation – Take advantage of the flexibility and integration of the GUI interface to create a custom DB2 overview with drill down capabilities**

# OMEGAMON XE For DB2

## Use The GUI To See A Global View Of DB2 Activity

**Thread Activity - 10.6.24.157:14000 - SYSADMIN**

File Edit View Help

**CPU and Wait Times**

Seconds

Correlation Identifier

Legend: Thread CPU Time (Yellow), Thread Wait Time (Blue)

**Thread Activity**

DB2ID	Plan Name	Correlation Identifier	Thread Status	Thread Type	Authorization Identifier	Connection	Connection	Elapsed	CPU	Wait	Thread Stored
D71G	KO2520HP	CMGDS03	Not_In_DB2	Allied	CMGDS						
D71C	KO2520HP	VDO2H@@L	Not_In_DB2	Allied	VDO2H						
D71C	KO2520HP	VDO2H@@L	Not_In_DB2	Allied	VDO2H						
D71C	DSNACLI	BBOLDAP	Swapped_Out	Allied	BBOLD						
D71C	?RRSAF	CB390	Not_In_DB2	Allied	CBDMP						
D71C	?RRSAF	CB390	Not_In_DB2	Allied	CBSYMC1	RRSAF	Unknown	00-02:15:44	00:00:00.971	00:00:00.581	SF
D71C	?RRSAF	CB390	Not_In_DB2	Allied	CBSYMC1	RRSAF	Unknown	00-02:15:44	00:00:00.971	00:00:00.581	SF

**Omegamon XE may be used to build a custom view of thread activity across multiple DB2s**

# Create Custom Queries To Build Aggregate Views

The screenshot displays the Tivoli Query Editor window. On the left, a tree view shows the hierarchy of data sources under 'MVS DB2', with 'Detailed Thread Exceptions' selected. The main pane shows the query configuration:

- Description:** Retrieve DB2 Threads information from DP Collector
- Data Source:** CMS DEMOMVS:CMS ip.pipe:#9.39.64.151[9002]
- Last Modified:** Thu, 12/12/2002 09:03 AM (by CCC\_220)
- Specification:** Query Results Source
- Query Results Source:** Let user assign explicitly (selected)
- Assigned:** DSNA:MVSA:DB2, DSNB:MVSA:DB2, DSNC:MVSA:DB2, DSND:MVSA:DB2, DSNT:MVSA:DB2
- Available Managed Systems:** DEMOMVS:CMS, XEDB2:MVSA
- Available Managed System Lists:** \*MVS\_DB2

Two black arrows point from a text box at the bottom to the 'Assigned' list and the 'Detailed Thread Exceptions' item in the tree view.

**Recommendation – Take advantage of the ability to build custom Omegamon queries to aggregate, analyze and summarize Omegamon monitor data**

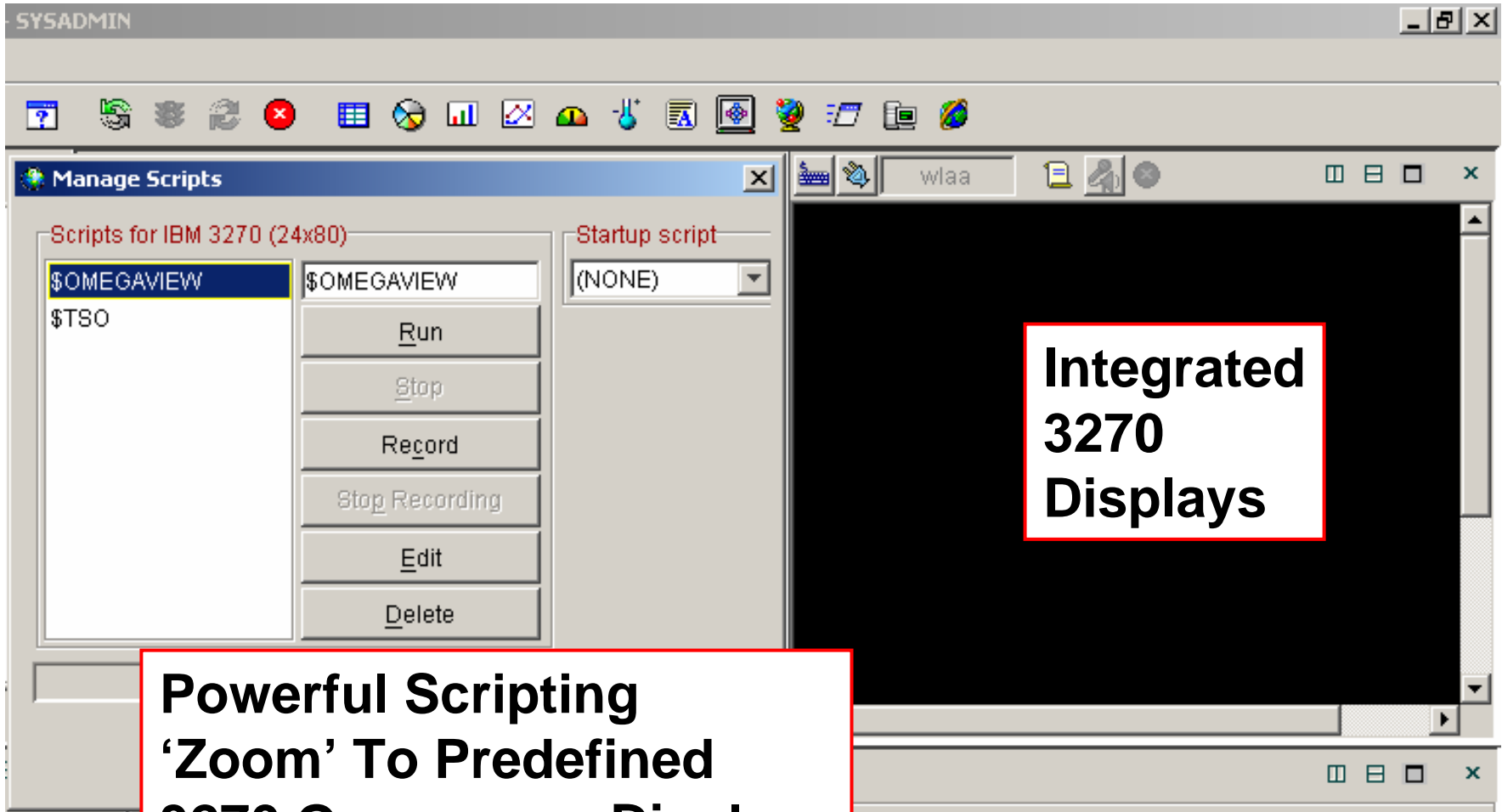
# Integrate 3270 Interface Into XE GUI Displays

The screenshot shows the 'Thread Activity' application window. The top part displays a 3270 terminal interface with a menu of thread-related options and a 'DISTRIBUTED THREAD DETAIL' section showing thread information for a plan named 'WKID'. The bottom part of the window shows a table of thread activity data.

DB2ID	Plan Name	Correlation Identifier	Thread Status	Thread Type	Thread Name	DB2CALL	DB2_CAF	Start Time	Elapsed Time	Wait Time	Stored Name	State
D71G	KO2520HP	CMGDS03	Not_In_DB2	Allied								SF
D71C	KO2520HP	VDO2H@@L	Not_In_DB2	Allied								SF
D71C	KO2520HP	VDO2H@@L	Not_In_DB2	Allied	VDO2H@@L	DB2CALL	DB2_CAF	01-12:05:29	00:00:02.161	00:00:00.000		SF
D71C	DSNACLI	BBOLDAP	Swapped_Out	Allied	BBOLDAP	RRSAF	Unknown	00-02:20:12	00:00:00.102	00:00:03.028		SF
D71C	?RRSAF	CB390	Not_In_DB2	Allied	CBDMNCR1	RRSAF	Unknown	00-02:18:06	00:00:02.349	00:00:00.000		SF
D71C	?RRSAF	CB390	Not_In_DB2	Allied	CBSYMC1	RRSAF	Unknown	00-02:16:06	00:00:00.441	00:00:00.000		SF
D71C	?RRSAF	CB390	Not_In_DB2	Allied	CBSYMC1	RRSAF	Unknown	00-02:15:44	00:00:00.971	00:00:00.581		SF

**Omegamon XE includes TN3270 support along with scripting capabilities**

# Integrate 3270 Into The XE GUI Views



**Powerful Scripting  
'Zoom' To Predefined  
3270 Omegamon Displays**



# OMEGAMON DB2

## Classic 3270 Interface Main Menu

### Use 3270 For Detailed Analysis

```

_____ ZMENU      VTM      O2      V540./C D81G 02/22/05  6:51:28  2
>  Help/News/Index PF1      Exit PF3      PF Keys PF5
>
>  Type a selection letter at the left end of the top line and press ENTER.
>
=====
>  OMEGAMON II FOR DB2 CLASSIC INTERFACE -- REALTIME MAIN MENU

_ S  SUMMARY ..... Summary of DB2 activity
_ E  EXCEPTIONS ..... Current or potential system problems
_ T  THREAD ACTIVITY ..... Thread activity information
_ U  THREAD ACTIVITY ..... Thread activity information by Package
_ L  LOCKING CONFLICTS .... Locking conflict information
_ R  RESOURCE MANAGERS .... Resource manager, other DB2 subsystem information
_ A  APPLICATION TRACE .... Trace and view application activity
_ D  DISTRIBUTED DATA .... Distributed database system information
_ O  OBJECT ANALYSIS ..... Object and Volume information
_ C  MVS CONSOLE ..... MVS console to issue commands and view messages
_ B  DB2 CONSOLE ..... DB2 console to issue
_ M  MISCELLANEOUS ..... Address space informa
_ P  PROFILE ..... Customize OMEGAMON se
_ H  HISTORICAL ..... Online historical info
_ I  IFCID TRACE ..... Start an IFCID Trace
_ Z  OTHER DB2 ..... Redirect monitoring to

```

**Use letter commands to navigate**  
**Select option T to see real time thread activity**



# Thread Activity Overview

```

=====
ZALLT      VTM      O2      V540./C D81G 02/22/05 7:12:19 2
> Help PF1  Back PF3      Up PF7      Down PF8      Sort PF10     Zoom PF11
> T.A
>          THREAD ACTIVITY:  Enter a selection letter on the top line.

> *-ALL    B-TSO    C-CICS    D-IMS      E-BACKGROUND  F-DIST ALLIED  G-DIST DBAC
> H-UTIL   I-INACT  J-FILTER  K-FUNCTIONS L-STORED PROC M-TRIGGERS   N-SYSPLEX
> O-ENCLAVES

=====
>          ALL THREADS CONNECTED TO DB2
THDA
+ *
+ Elapsed      Planname  CPU      Status      GetPg      Update      Commit      Jobname
+ -----
+ 02-01:29     KO2520IF  00.0%    NOT-IN-DB2   0           0           0           CXEGA03
+ 02-01:29     KO2520HP  00.0%    NOT-IN-DB2   0           0           0           CXEGA03
+ 02-01:23     KO2520IF  00.0%    NOT-IN-DB2   0           0           0           CXEGA03
+ 02-01:23     KO2520IF  00.0%    NOT-IN-DB2   0           0           0           CXEGA03
+ 01:52:49.6   KO2520IF  00.0%    NOT-IN-DB2   0           0           0           CXEGA03
+ 00:38:44.9   TRANSPLX  00.0%    NOT-IN-DB2   1230        300         0           CCCDS18
+ 00:00:05.7   DEMO1     00.0%    NOT-IN-DB2   4           0           0           DEMOENCL
=====

```

**Note high Getpage counts and high CPU%**

**The thread display may be sorted  
To view a specific thread position the  
cursor and press F11**



# Example – Analyze Thread Lock Detail

```

_____ ZLOCKO  VTM  O2          V540./C D81G 02/22/05  6:39:37  2
> Help PF1          Back PF3          Up PF7          Down PF8

>          THREAD INFORMATION:  Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS      *-LOCKS OWNED  E-GLOBAL LOCKS
> F-CURRENT SQL   G-SQL COUNTS  H-DISTRIBUTED    I-BUFFER POOL  J-GROUP BP
> K-PACKAGES      L-RES LIMIT   M-PARALLEL TASKS N-UTILITY    O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY   S-APPL TRACE   T-ENCLAVE
=====
>          LOCKS/CLAIMS OWNED BY A THREAD
PLAN
+ Thread:  Plan=TRANSPLX  Connid=CCCD518  Corrid=POOLDB210001  Authid=MHANS
+ Attach:  CICS   JOB=CCCD518  Tran=DB21  Task#=00127  Term=M485  Type=POOL
+ Package: CICSDB21      Collection=
own
+          Lock Ownership Information
+          Percent NUMLKUS          = .00          Total Locks Owned          = 5
+          Total Catalog Locks      = 1           Pageset and Dataset Locks = 1
+          Catalog Pageset Locks    = 1           Page/Row Locks             = 0
+          Catalog Page/Row Locks   = 0           Directory and Other Locks  = 3
+          Bind ACQUIRE option      = USE         Bind RELEASE option        = COMMIT
+          ISOLATION option          = Cursor Stability

+          Type      Level      Resource                                Number
+          ----      -
+          DTBS      S        DB=DSNDG07                                1
+          PSET      S        DB=DSNDG07      PS=DSN4K01          1
+          IS        IS       DB=DSNDB06      PS=SYSDBASE        1
+          IS        IS       DB=DSNDB01      PS=SCT02           1
+          SKCT      S        Plan=TRANSPLX                                1
+          -----
+          Total =          5

+          Claim Information
+          Type      Class      Resource
+          ----      -
+          IX        CS        DB=DSNDB06      PS=DSNDCX01

```

See thread level lock activity and locking detail in real time

Enter other letter commands on the command line to view more thread detail

# Example

## Viewing The Currently Executing SQL Statement

```

_____ ZSQL      VTM      O2      V540./C D81G 02/22/05 6:47:38 2
> Help PF1                                           Back PF3

>          THREAD INFORMATION:  Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS      D-LOCKS OWNED  E-GLOBAL LOCKS
> *-CURRENT SQL   G-SQL COUNTS  H-DISTRIBUTED     I-BUFFER POOL  J-GROUP BP
> K-PACKAGES      L-RES LIMIT   M-PARALLEL TASKS N-UTILITY      O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY    S-APPL TRACE   T-ENCLAVE
=====
>
>          SQL CALL BEING EXECUTED
PLAN
+ Thread:  Plan=TRANSPLX  Connid=CCCD18  Corrid=POOLDB210001  Authid=MHANS
+ Attach:  CICS  JOB=CCCD18  Tran=DB21  Task#=00127  Term=M485  Type=POOL
+ Package: CICSDB21      Collection=
call
+      SQL call is active, call information is as follows :
+
+      Thread Status = WAIT-REMREQ      SQL Request Type      = STATIC
+      Total SQL Reqs = 274910          SQL Call Type         = FETCH
+      SQL DBRM Name = CICSDB21         SQL Statement Number = 00073
+
+      DECLARE CUR1 CURSOR FOR SELECT I . DBNAME , I . TBCreator , I . TBNAME ,
+      I . NAME , I . CLUSTERING , I . CLUSTERRATIO , I . UNIQUERULE , I . FIR

```

**Hit enter to watch  
screen refresh**

**Press F8 to see additional SQL text detail**



# Thread Buffer & I/O Analysis

```

_____ ZBUF      VTM      O2      V540./C D81G 02/22/05  6:48:16  2
> Help PF1      Back PF3      Up PF7      Down PF8

>      THREAD INFORMATION:  Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS      D-LOCKS OWNED  E-GLOBAL LOCKS
> F-CURRENT SQL   G-SQL COUNTS  H-DISTRIBUTED  *-BUFFER POOL  J-GROUP BP
> K-PACKAGES      L-RES LIMIT   M-PARALLEL TASKS N-UTILITY      O-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY   S-APPL TRACE   T-ENCLAVE
=====
>      THREAD BUFFER POOL ACTIVITY

PLAN
+ Thread:  Plan=TRANSPLX  Connid=CCCD18  Corrid=POOLDB210001  Authid=MHANS
+ Attach:  CICS  JOB=CCCD18  Tran=DB21  Task#=00127  Term=M485  Type=POOL
+ Package: CICSDB21      Collection=
buf
+ Buffer Pool: BP0
+
+ Getpage Requests      =      494  Failed Getpage Requests      =      0
+ Synchronous Read I/O  =      21  Getpage/Read I/O              =      23.52
+ Page Updates          =      116  Seq Prefetch Requests        =      29
+ List Prefetch Requests =      29  Dynamic Prefetch Requests    =      0
+ Prefetch Pages Read   =      9   Pr
+ Hiperpool Reads      =      0   Fa

```

**Look at getpage and I/O counts for threads showing high I/O wait times**

**Real time views of thread getpage activity broken out by buffer pool**



# Object Information

Object Analysis Option Shows Thread Getpage & I/O

```

_____ ZTOBJ      VTM      O2      V540./C D81G 02/22/05  6:49:24  2
> Help PF1                                           Back PF3

>          THREAD INFORMATION:  Enter a selection letter on the top line.

> A-THREAD DETAIL B-LOCK COUNTS C-LOCK WAITS      D-LOCKS OWNED  E-GLOBAL LOCKS
> F-CURRENT SQL   G-SQL COUNTS  H-DISTRIBUTED     I-BUFFER POOL  J-GROUP BP
> K-PACKAGES      L-RES LIMIT   M-PARALLEL TASKS N-UTILITY      *-OBJECTS
> P-CANCEL THREAD Q-DB2 CONSOLE R-DSN ACTIVITY   S-APPL TRACE   T-ENCLAVE
=====
>          OBJECTS USED BY THREAD
PLAN
+ Thread:  Plan=TRANSPLX  Connid=CCCD18  Corrid=POO
+ Attach:  CICS  JOB=CCCD18  Tran=DB21  Task#=0012
+ Package: CICSD21      Collection=
tobj
+
+ Database  Spacenam  Dsn  Volume  Getpage  Sync  Prefetch I/O
+ Database  Spacenam  Dsn  Volume  Getpage  Read  Seq  List  Dynamic
+ -----  -----  ---  -----  -----  -----  -----  -----  -----
+ DSNDB06   DSNDX01  001  117     117      0     0     0     0
+ DSNDB06   SYSDBASE 001  13      13       0     0     0     0
+ DSNDB07   DSN4K01  001  78      78       0     0     0     0
=====

```

**Note Getpage and I/O information for the thread**

**Getpages**

Sync Read	Prefetch Seq	I/O List	I/O Dynamic
0	0	0	0
0	0	0	0
0	0	0	0

**I/Os**



# Application Trace Facility (ATF)

- Ability to selectively trace the execution of DB2 applications
- This information will help in your analysis of application flow and resource consumption
- ATF displays several types of information related to the execution of the thread
  - ▶ SQL access path at execution time
  - ▶ Pageset access and scan information
  - ▶ Sort activity
  - ▶ Locking information
  - ▶ DB2 times by thread, unit of work, program and SQL statement
- Uses DB2 performance traces to gather application information



# ATF – Collection Options

```

_____ ZATRQ   VTM   O2       V540./C DB8G 08/09/05  7:39:44  2
>      Help PF1                               Back PF3
> A.A
> *-SPECIFY TRACE   B-VIEW TRACE   C-STOP TRACE   D-SELECT DSN
> E-VIEW DATASET   F-STOP VIEW    G-CREATE VSAM LDS
=====
>                SPECIFY APPLICATION TRACE
ATRQ
+ Type DB2 Plan name to be traced. Also, provide additional optional
+ selection information to limit trace output. To save trace records
+ for later viewing you must specify a data set name for DSN
+
:   DSN=_____          Data set name
:   TIME=005             Number of mins to trace (001-060)
:   PLANNAME=_____     Plan name or ALL for all active threads
:   AUTHID=_____       DB2 authorization identifier
:   TSOUSER=_____      TSO USERID (TSO foreground app)
:   JOBNAME=_____      Jobname (TSO batch app)
:   CICSTRAN=_____     CICS trans id
:   CICSCONN=_____     CICS connection id)
:   PSBNAME=_____      IMS PSB name
:   IMSID=_____        IMS ID of the IMS region
:   LOCKDATA=Y           Collect DB2 lock trace recs? (Y/N)
:   SCANDATA=Y           Collect DB2 scan trace recs? (Y/N)

```

## Trace to memory

Trace data stored in  
**OMEGAMON**  
memory (up to 4MB)

When user exits  
**OMEGAMON** data  
goes to the 'bit'  
bucket

## Trace to Dataset

Trace data stored in  
**VSAM** data set

Use for later trace  
analysis and reports

If no DSN specified,  
trace data is sent to  
memory







# Omegamon 3270 Buffer Pool Snapshot Detail Analysis

```

_____ ZBPSN      VTM      O2      V540./C D81G 02/23/05 19:41:33  2
> Help PF1      Back PF3      Up PF7      Down PF8      Sort PF10      Zoom PF11
>
> A-BUFFER POOL      B-GROUP BUFFER POOL      *-BUFFER POOL SNAPSHOT      F-FILTER
=====
>
>          BUFFER POOL SNAPSHOT OPEN PAGESETS
>
BPSN 0
+ <<< The following BP snapshot was collected on 02/23/05 at 19:41:33. >>>
+
+
+          *
+ Pageaset      Pageaset      Use      Open      VP Pgs      HP Pgs      VP Pgs
+ Name          Type          Count     DS          Current     Current     Changed
+ -----
+ DSNDB01.DBD01      TABLESPACE      0      1          35          0          0
+ DSNDB01.SYSLGRNX   TABLESPACE      0      1          19          0          0
+ DSNDB06.DSNSX01   INDEXSPACE      0      1          17          0          0
+ DSNDB01.SCT02     TABLESPACE      0      1          14          0          0
+ DSNDB06.SYSSTR    TABLESPACE      0      1          13          0          0
+ DSNDB01.DSNLLX01  INDEXSPACE      0      1          12          0          0
+ DSNDBG07.DSN4K01  TABLESPACE      0      1          11          0          2
+ DSNDB06.DSNAPH01  INDEXSPACE      0
+ DSNDB06.DSNDCX01  INDEXSPACE      1
+
0
    
```

**\*-BUFFER POOL SNAPSHOT**

**Use F10 Sort option to sort by VP pages descending**

**Look for high utilization objects within the pool. F11 zoom to see more detail.**



# Object Details

```

_____ ZBPSD   VTM   O2   V540./C D81G 02/23/05 19:44:08  2
>  Help PF1      Back PF3      Up PF7      Down PF8
>
=====
>          BUFFER POOL SNAPSHOT DATASETS
>
BPSD
+ BP: 0      Pageset Name: DSNDB01.DBD01      Type: TABLESPACE  Open Datasets:  1
+
+ Dataset Name: DB2C71.DSNDBC.DSNDB01.DBD01.I0001.A001
+
+ VP Pages Current      =      35      HP Pages Current      =      0
+ VP Pages Maximum      =     3100      HP Pages Maximum      =      0
+ VP Pages Changed      =      0      VP Pages Changed Maximum =      0
+ Sync I/O Total Pages  =     189
+ Sync I/O Average Delay =      3      Sync I/O Maximum Delay =     19
+ Async I/O Average Delay =      0      Async I/O Maximum Delay =      0
+ Async I/O Total Pages =      0      Async I/O Total I/O Count =      0
=====

```

**Note pages used current versus pages high water mark as an indication of thrashing.**

**Detail found in the 3270 interface is useful for Virtual Pool tuning and analysis**



# EDM Pool Snapshot

```

ZEDSN      VTM      O2      V540./C D81G 02/23/05 20:37:24  2
> Help PF1      Back PF3      Zoom PF11
> R.C.A
=====
>
>          EDM POOL SNAPSHOT SUMMARY
>
EDSN
+ <<< The following EDM snapshot was collected on 02/23/05 at 20:37:24.  >>>
+
+ EDM
+ Storage Type      % of      Pages      Count of      Avg Pages      Max Pages
+                   Pool      Alloc      Entries      Entry          Entry
+ -----
+ DBDs              .9%       32.0        2             16.0           8.0
+ CTs               .1%        5.0         5             1.0            1.0
+ PTs               .0%        .0          0             .0              .0
+ SKCTs            .3%       10.5         5             2.1            4.0
+ CACHE            .0%        .5          2             .2              .2
+ SKPTs            .0%        .0          0             .0              .0
+ SQL CACHE        .0%        .0          0             .0              .0
+ FREE             98.7%     3655.0      1             3655.0         3655.0
=====
    
```

**F11 to see more detail.**

**The EDM pool snapshot shows more detail on EDM pool utilization**



# EDM Pool Detail

```

_____ ZEDSS   VTM      O2      V540./C D81G 02/23/05 20:38:13  2
>  Help PF1      Back PF3      Up PF7      Down PF8      Sort PF10
>
=====
>          EDM SNAPSHOT SKELETON CURSOR TABLES
>
EDSS
+          *
+          Planname      Pages Alloc      Bytes Used
+          -----
+          DEMO1          4.0          9176
+          KO2520AP       1.0          1680
+          KO2520HP       1.0          1680
+          KO2520IF       .7          1696
+          TRANSPLX      3.7          14800
=====
    
```

**This shows detail on the contents showing number of pages within the SKCT portion of the EDM pool**



# EDM Pool Snapshot Analysis – CUA Interface Example

## Dynamic SQL Cache Details

```

Actions(A) View(V) Options(O) Help(H)
09/25/02 11:05:07 AM
KD2RESCT Dynamic SQL cache statistics System:DSN
lines 1 To 12 of 250
    
```

Times Exec.	CPU Time	Elapsed Time	Wait Time	Get-Pages	Sync Reads	Sync Writes
408767	00:01:17.614	00:02:42.358	00:01:07.433	1435K	19266	0
241909	00:00:49.065	00:02:38.719	00:01:43.748	1204K	57809	0
182434	00:00:40.717	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000
182434	00:01:15.217	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000
98307	00:00:31.778	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000
92177	00:00:13.477	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000
39919	00:00:03.769	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000
14976	00:00:00.368	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000
14972	00:00:00.383	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000
11158	00:00:03.304	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000
10236	00:00:02.168	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000
9753	00:00:04.416	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000	00:00:00.000

```

09/25/02 11:05:28 AM
KD2RESCE SQL cache statistics detail System:DSN
lines 1 To 15 of 20

statistics require that monitor class 1 and ifcid 318 be started

Authorization Id: $EC

SELECT SID FROM SYSADM.TB_EC_SESSION WHERE SID = ? AND EXPIRES > CURRENT
TIMESTAMP + 1770 SECONDS FOR FETCH ONLY

Times Executed          408997   Synchronous Buffer Reads    19287
Getpages                1435987   Rows Examined              817948
Rows Processed          397810   Sorts Performed            0
Index Scans             408998   Tablespace Scans           0
Parallel Groups Created 0         Synchronous Writes         0
Elapsed Time            00:02:42.459   CPU Time                    00:01:17.660
wait for synch I/O      00:01:00.096   wait for Lock/Latch        00:00:07.318
synch Exec Switch       00:00:00.000   wait for Global Locks      00:00:00.000
    
```

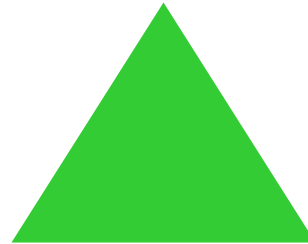


# Historical Monitoring Considerations And Options

## Cost Of Monitoring

## Value of Data

Collection overhead  
 Quantity of data  
 Quantity of storage  
 Storage and archival infrastructure  
 Cost of retrieval & data accessibility



Analytic value of the data  
 Ability to isolate problems  
 Ability to analyze and report  
 Ease of retrieval

- Historical data reporting and analysis strategies should be built around the concept of the cost of gathering relative to the value of the data gathered



# History Data Options

## OMEGAMON Provides Historical Analysis Flexibility

- DB2 Accounting data
  - ▶ High data volume poses challenges from a gathering, retention, and reporting perspective
  - ▶ Trace overhead considerations, DSNZPARM options, CICS RDO options
  - ▶ Essential for application analysis
- DB2 Statistics
  - ▶ Low cost and quantity of data
  - ▶ Important for subsystem tuning - Should always gather this data
- DB2 Performance & Audit traces
  - ▶ Event based detail beyond that provided by other sources
  - ▶ Cost may be high if many traces and many events traced
  - ▶ Recommend using tactically
- Snapshot
  - ▶ Overhead typically in monitoring infrastructure gathering and storage
  - ▶ Recommend using tactically - don't snapshot everything





# OMEGAMON XE For DB2

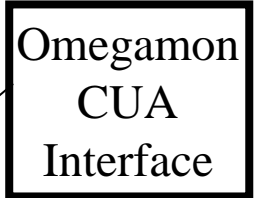
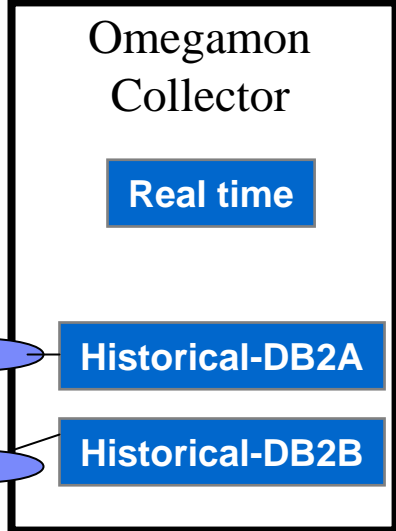
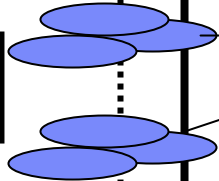
## Historical Data Gathering Capabilities And Flow

### Near Term Historical Data

Accounting, Statistics,  
Performance, Audit

**Omegamon 3270  
Interface**

VSAM



z/OS

# Near Term Thread History

Easy Access To History Within OMEGAMON Interface

```

_____ ZHATACT  VTM      O2      V540./C D81G 02/22/05  7:38:00   3
> Help PF1      Back PF3      Up PF7      Down PF8      Zoom PF11
>
>      Enter a selection letter on the top line.
>
> *-SUMMARY      B-BUFFER POOL      C-DB2 TIME      D-LOCK/SCAN/SORT
> O-OPTIONS
=====
>      THREAD HISTORY SUMMARY
HATH
+ Report Interval:  15 mins      Start: 02/22 07:15:00.000000
+ Report Filtered:   NO      End: 02/22 07:29:59.999999
act
+
+      Elapsed  CPU      Term
+ End Time      Plan      Authid  Time      Time      SQL      Commit  Abrt  Pkg  Status
+ -----
+ 07:25:52.899  TRANSPLX  MHANS   3138.42  44.758 1000K      1      0      1
+ 07:22:14.571  DEMO1    CXE12AUR  600.90   .011   11      1      0      1  EOT/AB
=====
    
```

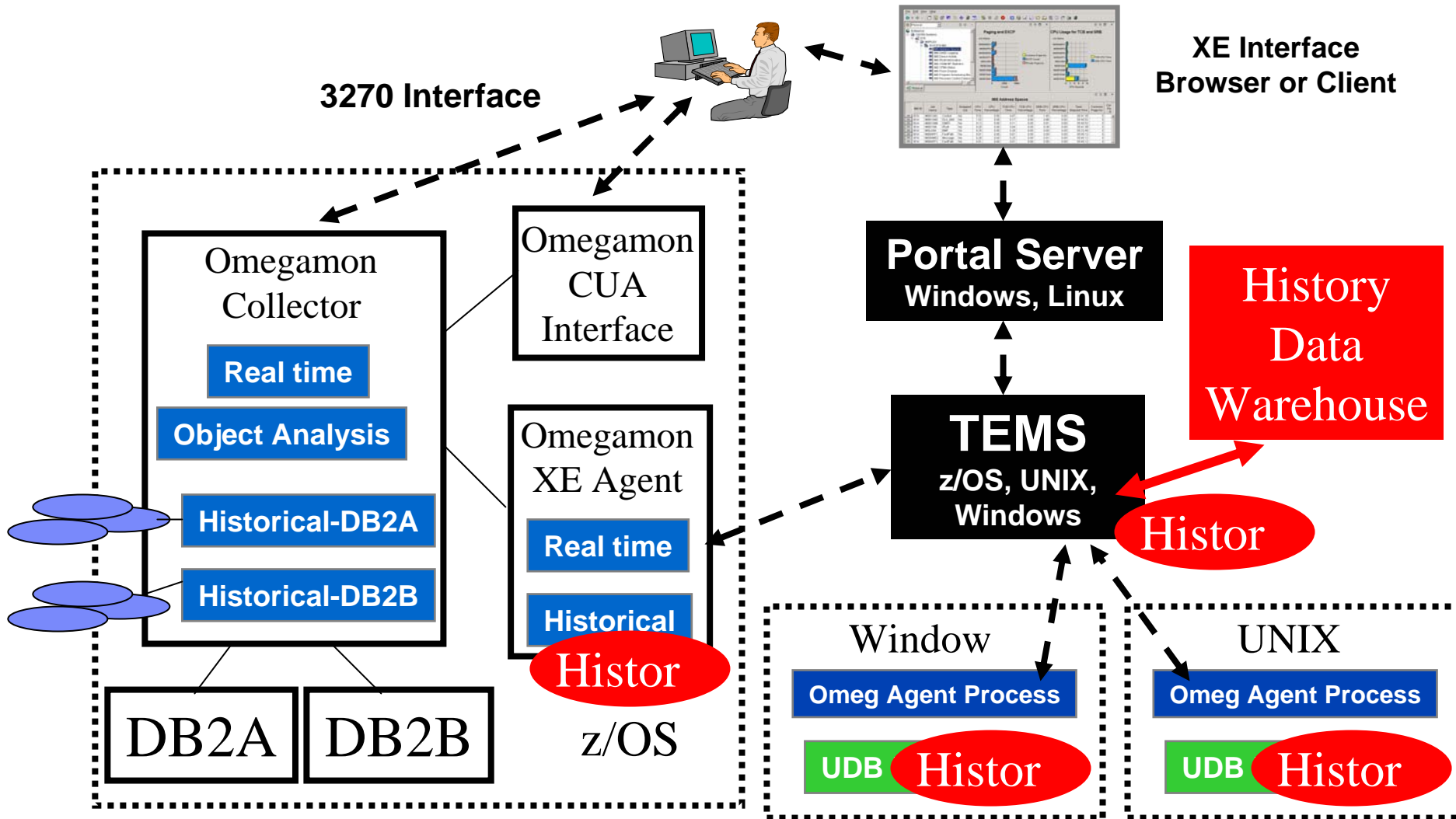
**F11 to see more detail on a thread**

**Omegamon allows thread history to be captured and reviewed from within the real time monitor. History is captured in VSAM files.**



# OMEGAMON XE For DB2

## Integrated Historical Support For UDB on z/OS, UNIX, Windows



# OMEGAMON XE Historical Interface

**Click history icon to request history**

**Select the Time Span**

Set Time Span

- None
- Last Hour
- Last 2 Hours
- Last 4 Hours
- Last 6 Hours
- Last 8 Hours
- Last 12 Hours
- Last 24 Hours
- Custom

Custom Start Time: 04/03/2005 08:26 PM

Custom End Time: 04/03/2005 08:26 PM

Time Column: Recording Time

Apply to all views associated with this view's query

OK Cancel Help

**Request a history time interval**

Buffer Pool

pool read time	pool write time	avg pool read time	avg pool write time	direct read t
0	0	0	0	

Application Time Information

# History Integrated Within Real Time XE GUI Interface

**CandleNet Portal** !Candle  
Managing what matters most™

File Edit View Help

---

Physical

- Enterprise
  - Windows Systems
    - HQDNT2
      - Universal Database - DB2:HQDNT2:UD
        - Application
        - Database
        - System Overview
        - Locking Conflict
        - Buffer Pool
        - Table Space
      - Universal Data Provider - HQDNT2ASFSd
      - Windows - hqdnt2
    - OS/390 Systems
      - DEMOPLX:MVS:SYSPLEX
        - Coupling Facility Policy Data for Sysplex
        - Coupling Facility Structures Data for Sysplex

### Application Identification and Status

agent id	appl id	appl status	snapshot time	appl name	auth id	client prdid	db name	execution id	corr token	client
0										

### Lock Wait Time

Recording Time	lock wait time	uow lock wait time	avg lock waittime	lock wait start time
04/03/05 15:00:00	0	0	0	
04/03/05 16:00:00	0	0	0	
04/03/05 17:00:00	0	0	0	
04/03/05 18:00:00	0	0	0	
04/03/05 19:00:00	0	0	0	
04/03/05 20:00:00	0	0	0	
04/03/05 21:00:00	0	0	0	

### Buffer Pool and Direct I/O Time

pool read time	pool write time	avg pool read time	avg pool write time	direct read time	direct write time
0	0	0	0	0	0

View history data

# Merging The Monitors

## A Comprehensive DB2 Performance Monitoring Solution

### **OMEGAMON XE For DB2 PM & OMEGAMON XE For DB2 PE**

What OMEGAMON XE for DB2 customers get merging with DB2 PE/PM

- DB2 Connect monitoring
- DB2 PM detailed reports and PWH (\*)
- Expert analysis using ROT and SQL queries
- Official DB2 IFI API support
- More granular snapshot history

What DB2 PE / PM customers get merging with OMEGAMON

- OMEGAMON near-term history
- Real time object analysis
- OMEGAMON classic 3270 VTAM end user interface
- OMEGAMON XE GUI interface
- One Central Server per LPAR
- The ability to integrate with MVS, CICS, IMS and distributed monitoring



# Omegamon XE Connect Monitoring Example - SQL Information

SQL Statements - WONGSU - SYSADMIN

File Edit View Help

Physical

DB2

- Thread Activity
- DB2 Connect Server
- System Status
- Detailed Thread Exception
- Lock Conflicts
- Subsystem Management
- Log Manager
- Utility Jobs
- EDM Pool
- Buffer Pool Management
- Volume Activity
- CICS Connections
- JMS Connections

Physical

### Time

6 (db2bp.exe)

Metric	Value
Appl Idle Time	1.0
Elapsed Time DB2conn Execution	6.0
Total Host Response Time	3.0
Most Recent UOW Elapsed Time	3.0
Total Stmt Exec Elapsed Time	3.0

### SQL Statement

Metric	Value
SQL Stmt Attempted	25000
Failed Stmt Operation	2000
Commit Stmt Attempted	1000
Rollback Stmt Attempted	2000

### SQL Statements

Application Name	Section Number	Query Cost Estimate	Query Number of Rows Estimate	Statement Operation	Number of Successful Fetches	Blocking Cursor	Outbound Blocking Cursor	Application Creator	Package Name	Stmt Trans No of Transmis
db2bp.exe	23	2	37	FETCH	6	1	0	HBJ	N/P	

### SQL Text

SQL Dynamic Statement Text

```
select * from account
```

Ready | Hub Time: Sun, 12/12/2004 09:52 PM | Server Available | SQL Statements - WONGSU - SYSADMIN

# Summary

- Omegamon offers options in terms of interfaces and capabilities
  - ▶ XE GUI Interface
    - High level overview, alerting, analysis, automation
  - ▶ 3270 Interface – Classic & CUA
    - Deep dive analysis
- Historical options
  - ▶ Omegamon Near Term History – 3270 Interface
  - ▶ XE GUI Interface snapshot historical
- Merger of monitors – a powerful combined solution
  - ▶ Omegamon XE for DB2/PM
  - ▶ Omegamon XE for DB2/PE





# Thank You!!!

