



IBM Software Group

# DB2 Subsystem Performance Analysis using OMEGAMON XE For DB2 UDB On z/OS

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A decorative horizontal bar at the bottom of the slide features a series of colorful squares (red, purple, cyan, green, yellow) followed by a white asterisk, a woman's face, and a grid of white dots on a red background.

@business on demand.

# Triangle

**OMEGAMON DE – Dashboard Edition**

High level monitoring  
Multi-system view  
Cross Platform View

OMEGAMON  
XE For  
DB2

**3270 Interface**

Subsystem details  
3270 Interface  
Historical details

**OMEGAMON XE**

Subsystem level monitoring  
Browser And GUI interface  
Proactive Alerting & Automation



# OMEGAMON XE For DB2 V300 Subsystem Tuning & Analysis

Real Time Monitoring –  
DB2 subsystem

- ✓EDM Pool analysis, VP analysis, logging

Choice Of Interfaces (XE Interface, 3270 interface)

Lock Conflict Analysis  
Near-Term Historical

- ✓Near-term history online

Historical Analysis - Batch

- ✓Batch reporting from VSAM, DB2 or SMF



# DB2

## What Are The Resources?

z/OS

CPU, Paging, WLM

DBM1

SQL

RDS - Optimizer

EDM

PTs, SKPTs, CTs, SKCTs  
DSC - Dynamic SQL

Sort Pool

RID Pool

Buffer Mgr - VPs

MSTR

Connections  
Threads

Logging

IRLM

Locking

DDF

Distributed

SP Addr Space

Stored Procedures

UDFs



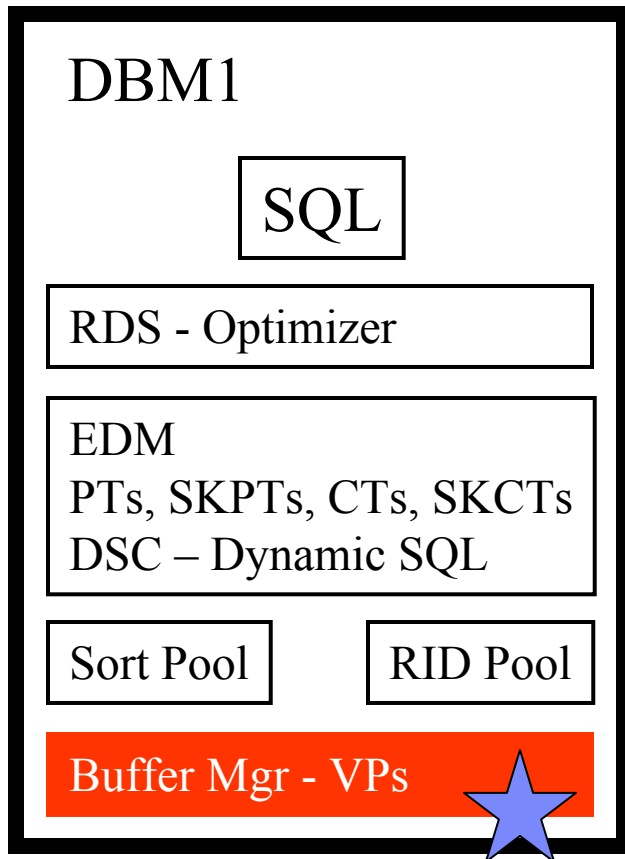
# Reviewing Statistics Trace Information

- **Statistics data provides a ‘feel’ for the subsystem and workload**
  - ▶ How busy is the system (Getpages, # SQLs, # Threads)
  - ▶ What is the nature of the workload
    - Using Stored Procedures, UDFs, and Triggers
    - Using Dynamic SQL
    - Using parallelism
- **Look for problem indicators**
  - ▶ Thread queuing
  - ▶ Poor pool performance
    - EDM, VP, Sort, RID pools
  - ▶ Lock escalation, deadlocks, timeouts



# Statistics Trace Analysis

## Buffer Pool Analysis



- **Are Buffer Manager Thresholds Being Reached?**
  - ▶ Examples - DWTH, DMTH, SPTH
- **Is The VP Sized Appropriately?**
  - ▶ Paging for Read or Write
  - ▶ Number of currently active buffers
- **What Is The VP 'Hit' Ratio?**
  - ▶ Synchronous Reads, Pages Read via Prefetch, Getpages

$$\text{Hit Ratio} = 1 - \frac{\text{Getpages} - (\text{Sync I/Os} + \text{Pages read via Prefetch})}{\text{Getpages}}$$

# OMEGAMON DB2

## Classic 3270 Interface Main Menu

```

_____ ZMENU      VTM      O2      V520./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 commands and view messages
_ M  MISCELLANEOUS ..... Address space information, OMEGAMON commands, etc.
_ P  PROFILE ..... Customize OMEGAMON session and exception settings
_ H  HISTORICAL ..... Online historical information
_ I  IFCID TRACE ..... Start an IFCID Trace
_ Z  OTHER DB2 ..... Redirect monitoring t

```

**Select option R to see  
resource information**



# DB2 Resource Selection Panel

```
ZRMMENU  VTM      02      V520./C D81G 02/23/05 19:20:00  2
> _____ Help PF1 _____ Back PF3
> R.
>
>          Enter a selection letter on the top line.
=====
>          RESOURCE MANAGERS AND OTHER DB2 SUBSYSTEM INFORMATION
=====
A  BUFFER MANAGER ..... Buffer Manager Information
-  B  LOG MANAGER ..... DB2 Log Manager Information
-  C  EDM POOL ..... EDM Pool Information
-  D  BIND STATISTICS ..... Bind Statistics
-  E  SUBSYSTEM MANAGER ..... DB2 Subsystem Support Manager Statistics
-  F  ACTIVE TRACES ..... Current Trace Activity
-  G  START-UP OPTIONS..... IRLM and Stored Procedures Start-Up Options
-  H  DSNZPARM ..... DB2 Installation Parameters
-  I  LOCK/CLAIM/DRAIN..... Lock Manager/Claim/Drain Statistics
-  J  SQL/RID POOL/PARALLEL... SQL/RID Pool/Parallelism/Stored Proc. Information
-  K  OPEN/CLOSE STATISTICS... Dataset Open and Close Statistics
-  L  DB2 COMMANDS ..... DB2 Command Statistics
=====
```

**Select option A to see  
buffer manager information**





# Buffer Manager Overview

```

_____ ZBMGR      VTM      O2      V520./C D81G 02/23/05 19:25:47  2
> Help PF1      Back PF3      Up PF7      Down PF8      Sort PF10      Zoom PF11
> R.A.A
>
> *-BUFFER POOL      B-GROUP BUFFER POOL
=====
>
                        BUFFER MANAGER INFORMATION

BMGR
+ Current Number Open Datasets      =      21
+ High Water Mark Open Datasets     =      21
+ Maximum Number Open Datasets Allowed =    3000
+ Open Dataset Count In Active Pools =      22
+
+ *
+ Pool      VP      HP      Pages      Pages      Getp      Read      Prefetch      Write
+ ID      Size      Size      Alloc      In Use      Rate      I/O Rate      Req Rate      I/O Rate
+ -----
+ BP0      4000      0      4000      238      .56      .23      .00      .00
+ BP1      500      0      0      0      .00      .00      .00      .00
+ BP32K    100      0      0      0      .00      .00      .00      .00
+ BP32K1   100      0      0      0      .00      .00      .00      .00
+ BP8K0    500      0      0      0      .00      .00      .00      .00
+ BP8K1    500      0      0      0      .00      .00      .00      .00

```

Position cursor and press  
F11 to zoom on a BP

Look at pages in use and I/O  
rate. Zoom in for more detail



# Buffer Pool Detail

```

_____ ZBP          VTM          O2          V520./C D81G 02/23/05 19:28:33  2
> Help PF1          Back PF3          Up PF7          Down PF8
>
> *-BUFFER POOL    B-GROUP BUFFER POOL    C-BUFFER POOL SNAPSHOT    H-HISTORICAL
=====
>
                                BUFFER POOL DETAIL

BP      0
+ Collection Interval:  REALTIME
+ Report Interval:      3 min
+
+ Virtual Buffer Pool Size=      4000
+ VPOOL Buffers Allocated =      4000
+ VPOOL Buffers in Use   =         6
+ VPOOL Buffers to be Del =         0
+ Use Count               =         21
+ VPTYPE                  =      PRIMARY
+
+ VP Sequential Thresh   =         80%
+ Deferred Write Thresh =         50%
+ VP Parallel Seq Thresh =        100%
+
+ Getpages per Sync I/O  =        12.83
+ Prefetch per I/O      =        75.00

Hiperpool Size           =         0
HPOOL Buffers Allocated =         0
HPOOL Buffers Backed    =         0
HPOOL Buffers to be Deleted =         0
Castout Attribute        =         YES

HP Sequential Thresh     =         80%
Vert Deferred Write Thresh =        10%
Sysplex Parallel Thresh =        75%

Pages Written per Write I/O =        2.00
Pages Read per Prefetch   =         .08
    
```

**Note pool threshold settings**

**Press F8 to scroll down and see more detail**



# Buffer Pool Detail

		ZBP	VTM	O2	V520./C D81G 02/23/05 19:28:33	25
+ Seq Prefetch per I/O	=		112.00		Pages Read per Seq Prefetch =	.07
+ List Prefetch per I/O	=		112.00		Pages Read per List Prefetch=	.01
+ Dyn Prefetch per I/O	=		1.00		Pages Read per Dyn Prefetch =	10.00
+ Max Concur Prefetch	=		0		Workfile Maximum	= 0
+ BP Hit % - Random	=		90.8%		HP Hit %	= .0%
+ BP Hit % - Sequential	=		94.3%		HP Read-to-Write %	= .0%
+						
+						
		TOTAL	INTERVAL	/SECOND	/THREAD	/COMMIT
		QUANTITY	QUANTITY	( 166)	( 0)	( 0)
-----						
+ Getpage Requests		2207				
+ Getpage Requests - Sequential		336				
+ Getpage Requests - Random		1871	65	.39	.00	.00
+ Getpage Failed - VPOOL Full		0	0	.00	.00	.00
+ Getpage Failed - Cond Request		0	0	.00	.00	.00
+						
+ Sync Read I/O Operations		172	0	.00	.00	.00
+ Sync Read I/Os - Sequential		0				
+ Sync Read I/Os - Random		172				
+ Page-in Required for Read I/O		181				
+ Pages Read via Seq Prefetch		8				
+ Seq Prefetch I/O Operations		1				
+ Sequential Prefetch Requests		112				

**Note buffer pool hit ratios**

**Note getpage counts and I/O counts for the buffer pool**

**Note the ratio of sync and async I/O activity. Note read versus write activity.**



# Buffer Pool Snapshot

```

_____ ZBPSN      VTM      O2      V520./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. >>>
+
+
+          *
+ Pageset          Pageset          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.DSNSSX01 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

```

**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      V520./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.**

**Note pages read sync versus async  
Note average I/O delay per page**



# Buffer Pool History

```

ZHBPS      VTM      O2      V520./C D81G 02/23/05 20:33:00  2
> Help PF1      Back PF3      Up PF7      Down PF8      Sort PF10      Zoom PF11
> H.A.C
>
>          Enter a selection letter on the top line.
>
> A-SUBSYSTEM SUPPORT      B-BIND      *-BUFFER POOL      D-GROUP BP
> E-DISTRIBUTED DATABASE    F-EDM POOL      G-LOG MANAGER      H-OPEN/CLOSE
> I-SQL/RID/PARALLEL/PROC  J-LOCK/CLAIM/DRAIN  K-GLOBAL LOCK      L-DB2 COMMANDS
> O-OPTIONS
=====
>          BUFFER POOL STATISTICS SUMMARY BY REPORT INTERVAL
HBPS  0
+ Collection Interval:  15 min                      Start:  02/22 20:30
+ Report Interval:    15 min      Combine Level:  NONE      End:    02/23 20:33
+
+ *
+
+          Pages      Prefetch      Prefetch      Getpages/      Pages/
+ Interval      in Use      Requests      Failures      Sync I/O      Write I/O      DMTH
+ -----
+ 02/23 20:33      310          0              0              .00            .00            0
+ 02/23 20:30     1011         0              0              .00            .00            0
+ 02/23 20:15      222         54
+ 02/23 20:00       56         58
+ 02/23 19:45       6          56

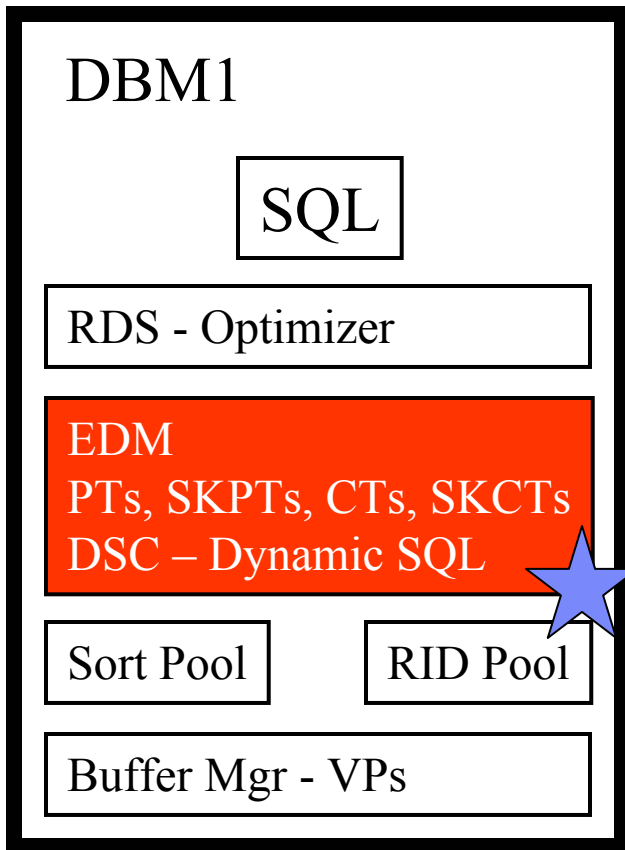
```

**Note historical trends for buffer pool activity. F11 to see more detail.**



# Statistics Trace Analysis

## EDM Pool Analysis



- **Is The EDM Pool Sized Appropriately?**
  - ▶ Pages in EDM pool & % in use
  - ▶ Failures due to pool full
- **How Is The EDM Pool Being Used?**
  - ▶ Page usage counts by type (CT, PT, SKCT, SKPT, DBD, Cache)
- **What Is The EDM Pool 'Hit ratio'?**
  - ▶ Number of requests, Number of requests not found in pool
- **Is Dynamic SQL Cache Being used Effectively?**
  - ▶ Inserts, Requests, Cache size
  - ▶ Calculate 'Hit' ratio

# EDM Pool Utilization

```

_____ ZEDMP      VTM      O2      V520./C D81G 02/23/05 20:36:37  2
>      Help PF1      Back PF3      Up PF7      Down PF8
> R.C
>
> A-EDM POOL SNAPSHOT                                     H-HISTORICAL
=====
>
>                      EDM POOL INFORMATION
EDMP
+ Collection Interval:  REALTIME                      Start:  02/23 20:36:33
+ Report Interval:     4 sec                          End:    02/23 20:36:37
+
+ Pool Usage      Pages  Pct      Percent of Total EDM Pool
+ -----
+ In Use          37    1% |> . . . . . . . . . . . . . . . . |
+ DBDs            32    1% |> . . . . . . . . . . . . . . . . |
+ CTs             5    0% | . . . . . . . . . . . . . . . . |
+ PTs             0    0% | . . . . . . . . . . . . . . . . |
+ Available      3666  99% |----->
+ SKCTs          11    0% | . . . . . . . . . . . . . . . . |
+ SKPTs           0    0% | . . . . . . . . . . . . . . . . |
+ SQL CACHE       0    0% | . . . . . . . . . . . . . . . . |
+ Free           3655  99% |----->
+ Total Pages    3703 100% |----->
+

```

**Pool display shows utilization by type**





# EDM Pool Snapshot

```

ZEDSN      VTM      O2      V520./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      V520./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 Usage History

```

ZHEDS      VTM      O2      V520./C D81G 02/23/05 20:38:57  2
> _____ Help PF1      Back PF3      Up PF7      Down PF8      Zoom PF11
> H.A.F
>
>          Enter a selection letter on the top line.
>
> A-SUBSYSTEM SUPPORT      B-BIND      C-BUFFER POOL      D-GROUP BP
> E-DISTRIBUTED DATABASE   *-EDM POOL      G-LOG MANAGER      H-OPEN/CLOSE
> I-SQL/RID/PARALLEL/PROC  J-LOCK/CLAIM/DRAIN  K-GLOBAL LOCK      L-DB2 COMMANDS
> O-OPTIONS
=====
>          EDM POOL STATISTICS SUMMARY BY REPORT INTERVAL
HEDS
+ Collection Interval:  15 min      Start:  02/22 20:30
+ Report Interval:     15 min      Combine Level:  NONE      End:    02/23 20:38
+
+          Pages      DBD      DBD      CT      CT      PT      PT      DSC      DSC
+ Interval      in Use%   Pages   Load%  Pages  Load%  Pages  Load%  Pages  Load%
+ -----
+ 02/23 20:38      1%      32     .00%    5     .00%    0     .00%    0     .00%
+ 02/23 20:30      1%      32     .00%    5     .00%    0     .00%    0     .00%
+ 02/23 20:15      1%      32     .00%    5     .00%    0     .00%    0     .00%
+ 02/23 20:00      1%      32     .00%   11     .00%    0     .00%    0     .00%
+ 02/23 19:45      1%      32     .00%   11     .00%    0     .00%    0     .00%
  
```

**Note % load to determine pool 'hit ratio'**

**Note historical trends for EDM pool activity. F11 to see more detail.**



# EDM Pool Analysis – 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	00:04:40.303	00:03:55.033	903144	39061	0
182434	00:01:13.217	00:				
98307	00:00:31.776	00:				
92177	00:00:12.477	00:				
39919	00:00:03.769	00:				
14976	00:00:00.368	00:				
14972	00:00:00.383	00:				
11158	00:00:03.304	00:				
10236	00:00:02.168	00:				
9753	00:00:04.416	00:				

```

    _____ 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

```

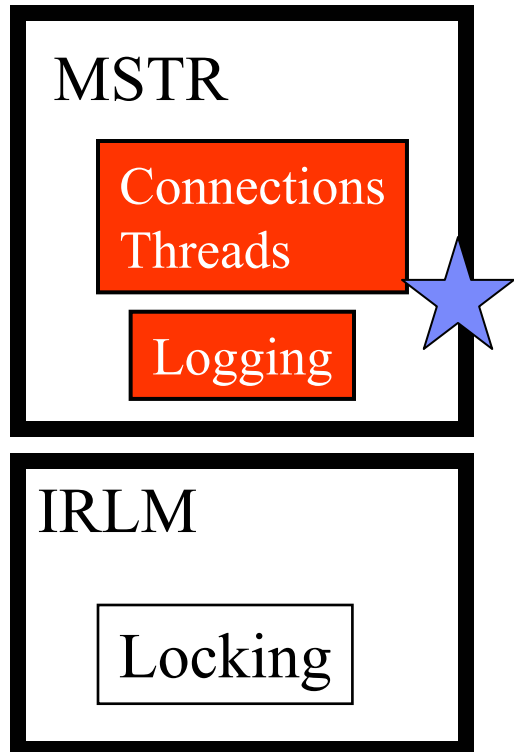
    SELECT SID FROM SYSADM.TB_EC_SESSION WHERE SID = ? AND EXPIRES > CURRENT
    TIMESTAMP + 1770 SECONDS FOR FETCH ONLY
  
```

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 synchron 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



# Statistics Trace Analysis

## Checkpoint & Log Performance



- **Checkpoint activity**
  - ▶ Number of checkpoints taken
- **Potential Logging Bottlenecks?**
  - ▶ Waits caused by unavailable output buffer
  - ▶ Number of log Control Intervals created - calculate rate
- **Is There Backout Activity?**
  - ▶ Reads from Output Buffer
  - ▶ Reads from Active Log
  - ▶ Reads from Archive Log



# Logging Statistics

```

_____ ZLOGM   VTM      O2      V520./C D81G 02/23/05 20:40:56  2
> Help PF1   Back PF3      Up PF7      Down PF8      Zoom PF11
> R.B
>
> H-HISTORICAL
=====
>
                                DB2 LOG MANAGER INFORMATION

LOGM
+ Collection Interval:  REALTIME          Start:  02/23 20:40:49
+ Report Interval:      6 sec             End:    02/23 20:40:56
+
+ Logging Mode          =  SINGLE          Archiving Mode          =  SINGLE
+ Number of Logs Defined =  3              Number of Logs Available =  2
+ Checkpoint Frequency =  50000           Records until Checkpoint = 21567
+ Input Buffer Size      =  60K             Output Buffer Size        = 4000K
+ Write Threshold       =  20              Current Log Record RBA   = 00006B2DCAB0
+
+ Primary Active Log    =  DB2C71.D81G.LOGCOPY1.DS01
+ Secondary Active Log  =
+

```

**Note checkpoint interval and number of log records written**



# Logging Statistics - continued

	ZLOGM	VTM	O2	V520./C	D81G	02/23/05	20:40:56	22
			TOTAL	INTERVAL	/SECOND	/THREAD	/COMMIT	
			QUANTITY	QUANTITY	( 6)	( 0)	( 0)	
			-----	-----	-----	-----	-----	
+ Reads from Output Buffers			0	0	.00	.00	.00	
+ Reads from Active Log			139	0	.00	.00	.00	
+ Reads from Archive Log			0	0	.00	.00	.00	
+ Reads Delayed - Tape Contention			0	0	.00	.00	.00	
+ Reads Delayed - No Tape Unit			0	0	.00	.00	.00	
+ Look-Ahead Tape Mounts Attempted			0	0	.00	.00	.00	
+ Look-Ahead Tape Mounts Performed			0	0	.00	.00	.00	
+ Write NOWAIT Requests			273	0	.00	.00	.00	
+ Write FORCE Requests			78160	1	.17	.00	.00	
+ Write Delayed - No Buffer			0	0	.00	.00	.00	
+ Write Active Log Buffers			78160	1	.17	.00	.00	
+ Active Log CIs Created			735	0	.00	.00	.00	
+ Archive Log Read Allocations			0	0	.00	.00	.00	
+ Archive Log Write Allocations			0	0	.00	.00	.00	
+ Archive Log CIs Offloaded			0	0	.00	.00	.00	
+ BSDS Access Requests			408					

**Note counters that indicate waits and delays**



# Logging Statistics - History

```

ZHLGS      VTM      O2      V520./C D81G 02/23/05 20:42:54  2
-----
> Help PF1      Back PF3      Up PF7      Down PF8      Zoom PF11
> H.A.G
>
>          Enter a selection letter on the top line.
>
> A-SUBSYSTEM SUPPORT      B-BIND      C-BUFFER POOL      D-GROUP BP
> E-DISTRIBUTED DATABASE   F-EDM POOL      *-LOG MANAGER      H-OPEN/CLOSE
> I-SQL/RID/PARALLEL/PROC  J-LOCK/CLAIM/DRAIN  K-GLOBAL LOCK      L-DB2 COMMANDS
> O-OPTIONS
=====
>          LOG MANAGER STATISTICS SUMMARY BY REPORT INTERVAL
HLGS
+ Collection Interval:  15 min                      Start:  02/22 20:30
+ Report Interval:    15 min  Combine Level:  NONE      End:    02/23 20:42
+
+
+          Total      Read      Total      Write      BSDS      Archive      Archive
+ Interval      Reads      Delay      Writes      Delay      Access      Read      Write
+ -----      -
+ 02/23 20:42      0        0        187        0          2          0        0
+ 02/23 20:30      0        0        225        0          2          0        0
+ 02/23 20:15      0        0        221        0          1          0        0
+                   225        0          2          0          2          0        0
+                   224        0          2          0          2          0        0

```

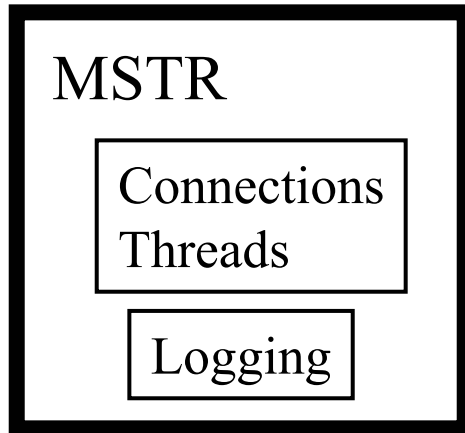
**Note historical trends for logging activity. F11 to see more detail.**

**Again note counters that indicate waits and delays**





# Locking Performance



- **Monitor locking activity**
  - ▶ Trend and analyze lock activity over time
- **Lock Conflicts and Lock Escalations**
  - ▶ Note when lock events occur
- **Optionally look at application activity in that time frame**



# Locking Statistics

```

_____ ZLOKM      VTM      O2      V520./C D81G 02/23/05 20:48:22  2
>      Help PF1      Back PF3      Up PF7      Down PF8
> R.I.A
>
> *-LOCK STATISTICS      B-GLOBAL LOCK STATISTICS      H-HISTORICAL
=====
>
>      LOCK MANAGER INFORMATION

LOKM
+ Collection Interval:  REALTIME      Start:  02/23 20:48:11
+ Report Interval:      11 sec      End:    02/23 20:48:22
+
+      TOTAL      INTERVAL      /SECOND      /THREAD      /COMMIT
+      QUANTITY      QUANTITY      (  11)      (  0)      (  0)
+      -----      -----      -----      -----      -----
+ Deadlocks Detected      37      0      .00      .00      .00
+ Timeouts Detected      0      0      .00      .00      .00
+ Susp Detected - Lock Only      0      0      .00      .00      .00
+ Susp Detected - Latch Only      2305      0      .00      .00      .00
+ Susp Detected - Other      685      2      .18      .00      .00
+
+ Lock Escalations - to Shared      0      0      .00      .00      .00
+ Lock Escalations - to Exclusive      0      0      .00      .00      .00

```

**Note deadlock and  
timeout counts**



# Locking History

```

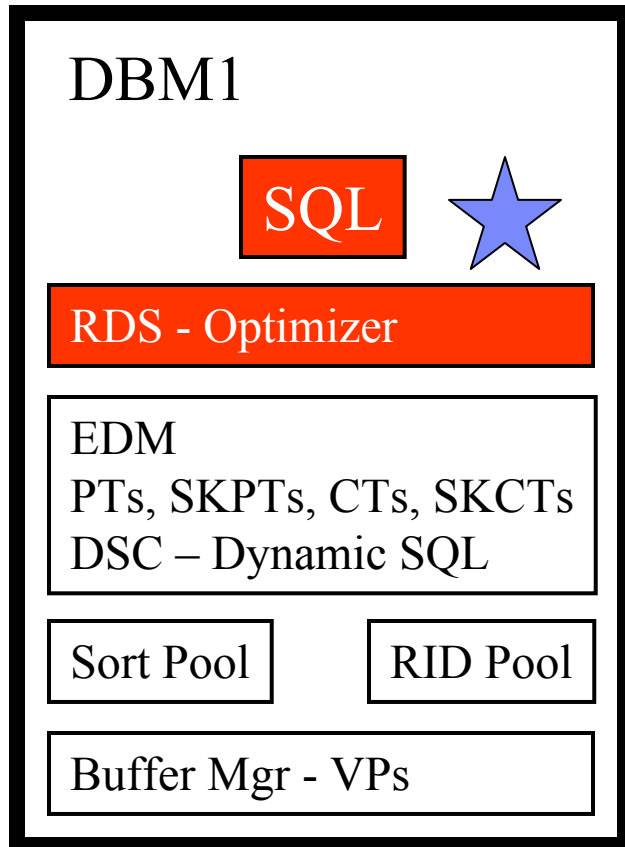
_____ ZHLKS   VTM   O2       V520./C D81G 02/23/05 20:49:10  2
> Help PF1   Back PF3   Up PF7     Down PF8     Zoom PF11
> H.A.J
>
>           Enter a selection letter on the top line.
>
> A-SUBSYSTEM SUPPORT      B-BIND          C-BUFFER POOL   D-GROUP BP
> E-DISTRIBUTED DATABASE   F-EDM POOL     G-LOG MANAGER   H-OPEN/CLOSE
> I-SQL/RID/PARALLEL/PROC *-LOCK/CLAIM/DRAIN K-GLOBAL LOCK   L-DB2 COMMANDS
> O-OPTIONS
=====
>           LOCK MANAGER STATISTICS SUMMARY BY REPORT INTERVAL
HLKS
+ Collection Interval:  15 min                Start:  02/22 20:45
+ Report Interval:     15 min  Combine Level:  NONE      End:    02/23 20:49
+
+
+ Interval          Deadlocks  Timeouts  Total      Total      Escalate   Escalate
+ -----          -
+ 02/23 20:49             0         0         2         458         0          0
+ 02/23 20:45             0         0         6        1815         0          0
+ 02/23 20:30             0         0        10        1802         0          0
+ 02/23 20:15             0         0         3        1937         0          0
+ 02/23 20:00             0         0        10
+ 02/23 19:45             0         0        10

```

**Note historical trends for locking activity. F11 to see more detail.**



# Statistics Traces Provide Insight On DB2 Workload Characteristics



- **Statistics provide information on the nature and activity of the DB2 workload**
- **Look at Statistics SQL counters to get a feel for the workload**
  - ▶ # of SQL calls, type of SQL calls
  - ▶ Dynamic versus static workload
  - ▶ SP, UDF, Trigger activity
- **Look for unusual counts**
  - ▶ Example – Numbers of Aborts



# SQL Activity Counts

```

_____ ZSQLC      VTM      O2      V520./C D81G 02/23/05 20:51:45  2
>      Help PF1      Back PF3 Up PF7      Down PF8
> R.J
>
> H-HISTORICAL
=====
>      SQL/RID POOL/PARALLELISM/STORED PROCEDURE INFORMATION

SQLC
+ Collection Interval:  REALTIME      Start:  02/23 20:51:39
+ Report Interval:      5 sec      End:    02/23 20:51:45
+ Maximum Degree of Parallelism Executed:      0
+
+      TOTAL  INTERVAL  /SECOND  /THREAD  /COMMIT  % OF
+ SQL Manipulative (DML)  QUANTITY  QUANTITY  ( 5)  ( 0)  ( 0)  DML
+ -----
+ SELECT      0      0      .00      .00      .00      .00
+ INSERT      0      0      .00      .00      .00      .00
+ UPDATE      0      0      .00      .00      .00      .00
+ DELETE      0      0      .00      .00      .00      .00
+ OPEN CURSOR    200      0      .00      .00      .00      .00
+ CLOSE CURSOR   200      0      .00      .00      .00      .00
+ FETCH      2000000      0      .00      .00      .00      .00
+ PREPARE      0      0
    
```

**F8 to scroll down and see more detail.**

**Display counts of the number and type of SQL performed by DB2**

# SQL Activity - continued

	ZSQLC	VTM	O2	V520./C	D81G	02/23/05	20:51:45	25
+ DESCRIBE			0	0	.00	.00	.00	.00
+ DESCRIBE TABLE			0	0	.00	.00	.00	.00
+ Total DML		2000400	0	0	.00	.00	.00	.00
+ SQL Control (DCL)		TOTAL QUANTITY	INTERVAL QUANTITY	/SECOND ( 5)	/THREAD ( 0)	/COMMIT ( 0)	% OF DCL	
+ CALL		10	0	.00	.00	.00	.00	.00
+ COMMENT ON		0	0	.00	.00	.00	.00	.00
+ CONNECT (TYPE 1)		0	0	.00	.00	.00	.00	.00
+ CONNECT (TYPE 2)		0	0	.00	.00	.00	.00	.00
+ GRANT		0	0	.00	.00	.00	.00	.00
+ INCREMENTAL BIND		0	0	.00	.00	.00	.00	.00
+ LABEL ON		0	0	.00	.00	.00	.00	.00
+ LOCK TABLE		0	0	.00	.00	.00	.00	.00
+ RELEASE		0	0	.00	.00	.00	.00	.00
+ REVOKE		0	0	.00	.00	.00	.00	.00
+ SET CONNECTION		0	0	.00	.00	.00	.00	.00
+ SET CURRENT DEGREE		1	0	.00	.00	.00	.00	.00
+ SET CURRENT RULES		0	0	.00	.00	.00	.00	.00
+ SET CURRENT SQLID		0	0	.00	.00	.00	.00	.00
+ SET HOST VARIABLE		0	0	.00	.00	.00	.00	.00
+ SET CURRENT PATH		0	0	.00	.00	.00	.00	.00

**F8 to scroll down  
and see more detail.**



# SQL Activity - continued

ZSQLC	VTM	O2	V520./C	D81G	02/23/05	20:51:45
+ RID Pool Accesses	QUANTITY	QUANTITY	( 5)	( 0)	( 0)	
+ Successful	2200	0	.00	.00	.00	
+ Not Used (No Storage)	0	0	.00	.00	.00	
+ Not Used (Max Limit)	0	0	.00	.00	.00	
+ RID Terminated (> RDS)	0	0	.00	.00	.00	
+ RID Terminated (> DM)	0	0	.00	.00	.00	
+ RID # (Highwater)	2	0	.00	.00	.00	
+ RID # (Current)	0	0	.00	.00	.00	
+ RID Exhausted Virtual	0	0	.00	.00	.00	
+ RID Exceeded Pool	0	0	.00	.00	.00	
	TOTAL	INTERVAL	/SECOND	/THREAD	/COMMIT	
+ Parallelism	QUANTITY	QUANTITY	( 5)	( 0)	( 0)	
+ Groups Executed	0	0	.00	.00	.00	
+ Planned Degree Executed	0	0	.00	.00	.00	
+ Reduced Degree Executed	0	0	.00	.00	.00	
+ Seq (Cursor)	0	0	.00	.00	.00	
+ Seq (No Buffer)	0	0	.00	.00	.00	
+ Seq (No ESA Sort)	0	0	.00	.00	.00	
+ Seq (No ESA Enclave)	0	0	.00	.00	.00	
+ Single DB2 (Coord=NO)	0	0	.00	.00	.00	

**F8 to scroll down and see more detail.**

**Look for failure type indicators.**



# SQL Activity - continued

```

20:51:4
_____ ZSQLC      VTM      O2      V520./C D81G 02/23/05
+
+           TOTAL   INTERVAL  /SECOND  /THREAD  /COMMIT
+ Stored Procedures   QUANTITY  QUANTITY  (    5)  (    0)  (    0)
+ -----
+ Call Statements           10           0           .00           .00           .00
+ Abended                   0           0           .00           .00           .00
+ Timed-Out                 0           0           .00           .00           .00
+ Rejected                   0           0           .00           .00           .00
+
+           TOTAL   INTERVAL  /SECOND  /THREAD  /COMMIT
+ User Defined Functions  QUANTITY  QUANTITY  (    5)  (    0)  (    0)
+ -----
+ UDFs Executed             0           0           .00           .00           .00
+ UDFs Abended              0           0           .00           .00           .00
+ UDFs Timed Out            0           0           .00           .00           .00
+ UDFs Rejected             0           0           .00           .00           .00
+
+           TOTAL   INTERVAL  /SECOND  /THREAD  /COMMIT
+ Triggers                 QUANTITY  QUANTITY  (    5)  (    0)  (    0)
+ -----
+ Statement Triggers Activ  0           0           .00           .00           .00
+ Row Triggers Activated    0           0           .00           .00           .00
+ SQL Error in Trigger      0           0
+ Maximum Nested SQL       1           1

```

**F8 to scroll down  
and see more detail.**

**Look for failure type  
indicators (abends,  
timeouts, etc)**





# SQL Activity - continued

```

_____ ZSQLC      VTM      O2      V520./C D81G 02/23/05 20:51:45
1
+
+
+          TOTAL      INTERVAL      /SECOND      /THREAD      /COMMIT
+ Prepare Statistics      QUANTITY      QUANTITY      (    5)      (    0)      (    0)
+ -----
+ Copied from Cache          0          0          .00          .00          .00
+ No Match                   0          0          .00          .00          .00
+ Implicit KEEP DYNAMIC(YES) 0          0          .00          .00          .00
+ Avoided KEEP DYNAMIC(YES)  0          0          .00          .00          .00
+ Discarded - MAXKEEPD       0          0          .00          .00          .00
+ Purged - DROP/ALTER/REVO   0          0          .00          .00          .00
+
+          TOTAL      INTERVAL      /SECOND      /THREAD      /COMMIT
+ Direct Row Access      QUANTITY      QUANTITY      (    5)      (    0)      (    0)
+ -----
+ Successful              0          0          .00          .00          .00
+ Revert to Index         0          0          .00          .00          .00

```

**SQL counts in general provide an insight into the nature of the workload on DB2**

**Note prepare and dynamic SQL statistics. Use to determine dynamic SQL cache 'hit ratio'**



# Historical Reporting Access

```
Candle ----- HISTORICAL MAIN MENU ----- OMEGAMON II for DB2  
OPTION ==> 1
```

- 1 REPORT - Generate historical reports
- 2 COLLECT - Edit data collection specifications
- 3 EXTRACT - Edit SMF/GTF extract specifications
- 4 SUMMARIZE - Edit data summarization specifications
- 5 DICTIONARY - Display data dictionary
- 6 MESSAGES - Display OMEGAMON messages
- 7 ATF REPORT - Display ATF trace from VSAM dataset
  
- X EXIT - Return to OMEGAMON primary menu

Enter END command to return to OMEGAMON primary menu

```
F1=HELP      F2=SPLIT     F3=END       F4=RETURN    F5=RFIND     F6=RCHANGE  
F7=UP        F8=DOWN     F9=SWAP     F10=LEFT    F11=RIGHT    F12=RETRIEVE
```

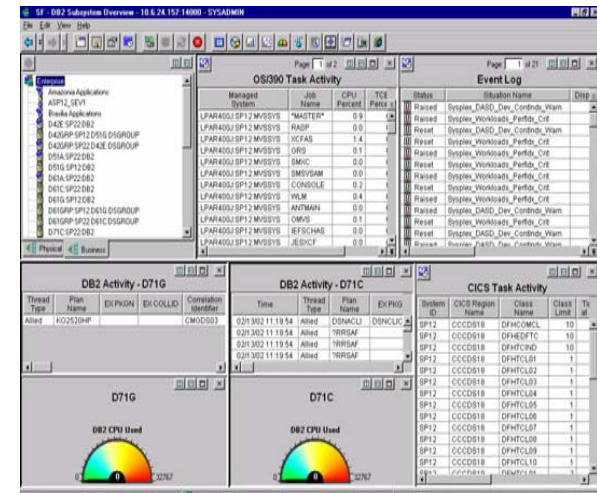
**ISPF interface to create and manage historical reporting**



# OMEGAMON XE For DB2

## Choice Of Interfaces

- **OMEGAMON XE GUI Interface**
  - ▶ Accessible via Java client or web browser
  - ▶ Real time and historical
  - ▶ Automation & alerts
  
- **OMEGAMON II for DB2**
  - ▶ 3270 Interface
  - ▶ CUA Interface & Classic Interface
  - ▶ Real Time & Historical



```

ZTOIST  VTN  02      V540./C DB2X 85/83/84 15:02:06  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  *-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
> U-LONG NAMES

-----
>                                     DISTRIBUTED THREAD DETAIL
PLAN
+ Thread: Plan=WKID      Connid=RRSAF      Corrid=MYCORRID      Authid=PKENN
+ Attach: RRSAF          JOB Name=..PKENNW      JOB Asid= 53K
+ Package: WKID          Collection=

+                                     Distributed RRSAF Data
+Location      IP Addr      Port Ctuser  Srvclsnan  Prod ID  Workstation
+-----+-----+-----+-----+-----+-----
+N/A           N/A         N/A         PKENNEY    N/A      N/A         MY_WORKSTATION_NAM
+
+Transaction name: MYAPPL_EXE
  
```

# OMEGAMON XE For DB2 – XE

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

File Edit View Help

---

Physical

- [-] Detailed Thread Exception
- [-] Lock Conflicts
- [-] Subsystem Management
- [-] Log Manager
- [-] Utility Jobs
- [-] EDM Pool
- [-] Buffer Pool Management
- [-] Volume Activity
- [-] CICS Connections
- [-] IMS Connections
- [-] D81G:SP12:DB2
  - System Status**
  - [-] Detailed Thread Exception
  - [-] Lock Conflicts
  - [-] Subsystem Management
  - [-] Log Manager
  - [-] Utility Jobs
  - [-] EDM Pool
  - [-] Buffer Pool Management

Demo System Physical

**EDM Utilization**

0.8

**DDF Send Rate**

0.0

**DB Wait Percent**

0.0

**DDF Receive Rate**

0.0

**View DB2 performance using Java GUI Interface. Run in a browser, or using a Java client.**

**System State Information**

Time	Interval Time	Waiting On Tape Mount	DDF Inactive	Global Trace Active	EDM Utilization	DB Wait Percent	Indoubt Threads	Threads Waiting On Limit	Threads Waiting On Locks	Users Waiting For Threads	DDF Send Rate	DDF Receive Rate
05/10/04 12:58:37	38	False	False	False	0.8	0.0	0	0	0	0	0.0	0.0

**DB2 System: D81G, MVS System: SP12**

# OMEGAMON XE For DB2 - XE Interface

The screenshot displays the System Resource Manager (Log) interface for a DB2 subsystem. The left pane shows a tree view of the subsystem components, with 'Log Manager' highlighted. The main pane is divided into two sections: 'Log Manager Statistics' and 'Dataset Utilization'.

**Log Manager Statistics**

Description	Total	Delta	Rate
Reads_from_Output_Buffers	0	0	0.0
Reads_from_Active_Log	47060	0	0.0
Reads_from_Archive_Log	0	0	0.0
Reads_Delayed_-_Tape_Contention	0	0	0.0
Reads_Delayed_-_No_Tape_Unit	0	0	0.0
Look-Ahead_Tape_Mounts_Attempted	0	0	0.0
Look-Ahead_Tape_Mounts_Performed	0	0	0.0
Look-Ahead_Tape_Mounts_Failed	0	0	0.0
Write_NOWAIT_Requests	172	0	0.0
Write_Wait	0	0	0.0
Write_FORCE_Requests	4957	60	0.2
Write_Delayed_-_No_Buffer	0	0	0.0
Write_Active_Log_Buffers	4957	60	0.2
Active_Log_Cls_Created	50	1	0.0
Archive_Log_Read_Allocations	0	0	0.0
Archive_Log_Write_Allocations	0	0	0.0
Archive_Log_Cls_Offloaded	0	0	0.0
BSDS_Access_Requests	53	0	0.0

**Dataset Utilization**

A vertical bar chart showing dataset utilization. The scale ranges from 0 to 32767. The current utilization is 54, indicated by a blue circle at the bottom of the bar.

**Log Manager Summary**

Archive ording Mode	Logs Defined	Logs Available	Checkpoint Frequency	Next Checkpoint	Input Buffer Size (K)	Output Buffer Size (K)	Write Threshold	Dataset Size (K)
	3	2	50000	44871	40	400	20	34560

**View Subsystem stats, Threads, EDM pools, Buffers, Utilities, I/O**

**Predefined displays for each category**

## Summary And Conclusions

- **Use OMEGAMON DB2 to gather and analyze DB2 subsystem level statistics data**
- **OMEGAMON supports both real time as well as historical information**
- **OMEGAMON XE interface provides additional powerful DB2 performance analysis and management capabilities**

