



Using the DC Monitor for IMS Performance Analysis

E33

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Objectives

- ▲ **Explain a useful methodology for analyzing TM Monitor reports**
 - ▶ Includes some analysis techniques
 - ▶ The intent is to discover fruitful areas for analysis and/or tuning efforts
- ▲ **Provide some performance-related hints and tips**

Agenda

▲ The first pass

- ▶ Obtain perspective
- ▶ Discover some things for possible tuning actions and/or further analysis

▲ Using the Program Summary report

- ▶ Discover what to tune from an application program perspective
 - Which application programs?
 - Which data bases?

IMS Technical Conference
October 23 - 27, 2000



The First Pass



REPORTS Report

IMS MONITOR ****REPORTS**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14
NO INTENT FAILURES IN THIS TRACE
NO POOL SPACE FAILURES IN THIS TRACE
NO DEADLOCK EVENTS IN THIS TRACE
TOTAL TIMES ECBS WAITED FOR SAPS = 0
MONITOR OVERHEAD DATA
247929 MILLISECONDS, TRACE INTERVAL
1837553 MONITOR RECORDS WERE PRODUCED

 TIMES 70 BYTES = 128,628,710 BYTES

Reports Report

▲ Intent failures (usually not a problem)

- ▶ PSB causes schedule failure because of conflict with PROCOPT=E

▲ Pool space failures

- ▶ Increase appropriate pool size

PSB pool, reported as DLMP
DMB pool, reported as DLDP
PSBW pool, reported as PSBW
DBWP pool, reported as DPSB

▲ Deadlocks

- ▶ If deadlocks are a problem, the X'67FF' log records are the best tool for analysis

RUN PROFILE

```
IMS MONITOR  **RUN PROFILE**                START 122  14:22:06 TRACE STOP 122  14:26:14
TRACE ELAPSED TIME IN SECONDS.....247.9
TOTAL NUMBER OF MESSAGES DEQUEUED....6466
TOTAL NUMBER OF SCHEDULES          ....6103
NUMBER OF TRANSACTIONS PER SECOND  26.0
TOTAL NUMBER OF DL/I CALLS ISSUED...404869
NUMBER OF DL/I CALLS PER TRANSACTION  62.6
NUMBER OF OSAM BUFFER POOL I/O'S.      0,      0.0 PER TRANSACTION
NUMBER OF MESSAGE QUEUE POOL I/O'S.....1684,  0.2 PER TRANSACTION
NUMBER OF FORMAT BUFFER POOL I/O'S.....4,      0.0 PER TRANSACTION
```



404,869 CALLS DIVIDED BY 247.9 SECS = 1,633 CALLS/SEC

Run Profile

▲ Use to collect statistics

- ▶ Monitor interval: 247.9 SECS
- ▶ Transaction execution rate: 26.0 TRAN/SEC
- ▶ DL/I Call rate: 1,633 CALLS/SEC
- ▶ Message Queue Pool I/Os: 6.8 per SEC
- ▶ Format Buffer Pool I/Os: negligible
- ▶ PSB schedules per transaction: $6103/6466 = .94$

LATCH CONFLICT STATISTICS

IMS MONITOR ** GENERAL REPORTS ** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

LATCH CONFLICT STATISTICS

LATCH NAMES	COUNT FIELD	AT START	AT END	DIFF.
DISP	CONTENTIONS	0	0	0
DCSL	CONTENTIONS	0	0	0
SCHD	CONTENTIONS	5	1	4
TCTB	CONTENTIONS	710	179	531
PDRB	CONTENTIONS	0	0	0
PSBP	CONTENTIONS	38	15	23
DMBP	CONTENTIONS	0	0	0
PSBB	CONTENTIONS	0	0	0
DMBB	CONTENTIONS	32	17	15
PDRP	CONTENTIONS	1	0	1
SUBQ	CONTENTIONS	87	12	75
DBSL	CONTENTIONS	0	0	0
VTCB	CONTENTIONS	7	0	7
VLQB	CONTENTIONS	10	1	9
CBTS	CONTENTIONS	20	5	15
BLKM	CONTENTIONS	0	0	0
QMGR	CONTENTIONS	902	289	613
QBSL	CONTENTIONS	21	2	19
SMGT	CONTENTIONS	25	10	15
DBLK	CONTENTIONS	0	0	0
XCNQ	CONTENTIONS	1652	576	1076
ACTL	CONTENTIONS	0	3761	3761
LOGL	CONTENTIONS	2482	1052	1430

Latch Conflict Statistics

- ▲ **Latch conflict indicates an IMS task had to wait**
 - ▶ Do not know how long tasks had to wait
- ▲ **Latch statistics are reset every system checkpoint**
 - ▶ If a system checkpoint occurs during the monitor interval, the reported counts are misleading
- ▲ **DMBB (DB latch): May have high counts if using segment compression**

Latch Conflict Statistics

▲ **ACTL (monitor buffer latch): High counts indicate monitor data set buffer contention**

- ▶ Specify half-track blocking and set BUFNO=20 to 40 on IMSMON DD statement!
- ▶ Ensure all IMS-related regions are executing at a high priority
- ▶ High count results in measurable distortion of statistics

▲ **LOGL (logical logger latch): High counts indicate logging bottleneck**

- ▶ Inadequate number of OLDS buffers
- ▶ Too few WADS track groups
- ▶ Improper dispatching priorities (particularly for dependent regions)

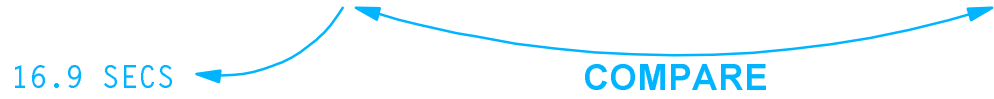
SCHEDULING AND TERMINATION

IMS MONITOR *****REGION SUMMARY*****

TRACE START 122 14:22:06

TRACE STOP 122 14:26:14

		.....ELAPSED TIME.....			NOT IWAIT TIME(ELAPSED-IWAIT)		
		TOTAL	MEAN	MAXIMUM	TOTAL	MEAN	MAXIMUM
<u>SCHEDULING AND TERMINATION</u>							
**REGION	1	1	146823	146823	112309	112309	112309
**REGION	3	146	359796	2464	359796	2464	14265
**REGION	4	1023	2922347	2856	1006267	2814	1006267
**REGION	5	5	65257	13051	39439	7887	21760
**REGION	6	1061	2946003	2776	1007746	2700	1007746
**REGION	8	141	388921	2758	81013	2758	81013
**REGION	10	101	300852	2978	78730	2926	78730
**REGION	14	698	1750057	2507	92228	2123	65720
**REGION	16	97	438641	4522	87875	4343	87875
**REGION	17	2	229690	114845	112940	67626	66669
**REGION	18	1	51894	51894	51894	51894	51894
**REGION	21	148	351007	2371	81197	2371	81197
**REGION	22	499	1160332	2325	52569	1142643	2289
**REGION	23	145	291785	2012	16003	291785	2012
**REGION	24	1007	2163229	2148	80777	2067448	2053
**REGION	27	1	61059	61059	57417	37778	34136
**REGION	28	146	364079	2493	82114	364079	2493
**REGION	31	144	481130	3341	151263	481130	3341
**REGION	34	722	2429412	3364	1075362	2381262	3298
**TOTALS		6088	16902314	2776	16148603	2652	



Scheduling and Termination

- ▲ **Termination is usually not a problem**

- ▲ **Scheduling of dependent regions can encounter delays which can be minimized or avoided**
 - ▶ Pool space failures
 - ▶ Waits on Block Loader (ACBLIB access)
 - ▶ Message Queue data set I/O to prime message for GU IOPCB
 - ▶ Schedule attempts that fail parallel scheduling algorithm

- ▲ **Note Scheduling and Termination elapsed time: 16.9 SECS**

Schedule to First Call

IMS MONITOR ****REGION SUMMARY**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

		.....ELAPSED TIME.....			NOT IWAIT TIME(ELAPSED-IWAIT)		
OCCURRENCES		TOTAL	MEAN	MAXIMUM	TOTAL	MEAN	MAXIMUM
SCHEDULE TO FIRST CALL							
**REGION	1	1	108574	108574	108574		
**REGION	3	147	1524484	10370	26647		
**REGION	4	1024	10673310	10423	414006		
**REGION	5	6	460417	76736	92533		
**REGION	6	1062	10828303	10196	113077		
**REGION	8	141	1630214	11561	76554		
**REGION	10	102	1226900	12028	32208		
**REGION	14	698	10320783	14786	169301		
**REGION	16	98	1253598	12791	89523		
**REGION	17	3	4921623	1640541	3769301		
**REGION	18	1	195665	195665	195665		
**REGION	21	149	1502959	10086	29485		
**REGION	22	500	5185997	10371	197859		
**REGION	23	145	1550726	10694	25749		
**REGION	24	1007	9845964	9777	109731		
**REGION	27	2	1748107	874053	1338549		
**REGION	28	145	1521886	10495	30551		
**REGION	31	145	1598507	11024	29026		
**REGION	34	721	13209653	18321	364715		
**TOTALS		6097	79307670	13007			

79.3 SECS 13.0 MS

Schedule to First Call

- ▲ **Generally, only a problem for MPRs**
- ▲ **1st segment of input has been primed and control passed to the dependent region for execution**
 - ▶ Usually, the most significant activity during this period is program load
 - ▶ Language execution and runtime options may have measurable effect
 - ▶ Page faulting of application program could be a problem
 - ▶ Application program housekeeping
 - ▶ A well-tuned system should be able to achieve an average time of less than 5ms
- ▲ **Program load options**
 - ▶ Preload, Virtual Fetch, LLA/VLF, BLDL list, Program LOAD (SRCH=option)
- ▲ **Note Schedule to First Call elapsed time: 79.3 SECS**
- ▲ **13.0 MS average can be lowered to 5 MS or less**

ELAPSED EXECUTION

IMS MONITOR *****REGION SUMMARY***** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

		.....ELAPSED TIME.....			NOT IWAIT TIME(ELAPSED-IWAIT)		
		<u>TOTAL</u>	<u>MEAN</u>	<u>MAXIMUM</u>	<u>TOTAL</u>	<u>MEAN</u>	<u>MAXIMUM</u>
<u>OCCURRENCES</u>							
<u>ELAPSED EXECUTION</u>							
**REGION	1	1	128199921	128199921	128199921		
**REGION	3	147	41866354	284805	26484813		
**REGION	4	1024	90360543	88242	7602440		
**REGION	5	6	2832292	472048	1022510		
**REGION	6	1062	86280951	81243	2237780		
**REGION	8	142	24546777	172864	9029196		
**REGION	10	102	11968243	117335	704481		
**REGION	14	698	93340293	133725	14278702		
**REGION	16	98	13271099	135419	635907		
**REGION	17	3	94484890	31494963	83914496		
**REGION	18	1	135531878	135531878	135531878		
**REGION	21	149	16176646	108568	510019		
**REGION	22	500	71053920	142107	2677139		
**REGION	23	146	15413201	105569	670779		
**REGION	24	1007	92723096	92078	7824781		
**REGION	26	1	247929124	247929124	247929124		
**REGION	27	2	222801950	111400975	163039661		
**REGION	28	147	16630997	113136	650799		
**REGION	31	145	17307954	119365	713295		
**REGION	34	722	85990370	119100	1820785		
**TOTALS		6103	1508710499	247208			

1,508.7 SECS

Elapsed Execution

- ▲ **Time is elapsed time PSBs were scheduled**
 - ▶ Time may be 'distorted'
 - WFI and pseudo-WFI driven regions
 - ▶ Time includes application program non-DLI activity
- ▲ **Note total Elapsed Execution time: 1,508.7 SECS**

DL/I CALLS

IMS MONITOR ****REGION SUMMARY****

TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

DL/I CALLS	OCCURRENCES	.....ELAPSED TIME.....			NOT IWAIT TIME(ELAPSED-IWAIT)			IWT/CALL
		TOTAL	MEAN	MAXIMUM	TOTAL	MEAN	MAXIMUM	
**REGION 1	518	1232521	2379	156774	818996	1581	156774	0.39
**REGION 3	7885	33913083	4300	236647	2974194	377	54707	0.31
**REGION 4	21780	69944445	3211	711213	10897206	500	218272	0.29
**REGION 5	1451	1727484	1190	247561	479808	330	17158	0.23
**REGION 6	24836	65896557	2702	398056	11877412	487	81754	0.26
**REGION 8	7250	17093161	2357	293597	2792791	385	50425	0.18
**REGION 10	5519	6030386	1092	182399	1699705	307	58265	0.12
**REGION 14	46122	73357782	1590	1110881	16494431	357	1077256	0.15
**REGION 16	4168	6798887	1631	154179	1528305	366	64149	0.19
**REGION 17	32383	46831705	1446	538476	42484807	1311	538476	0.02
**REGION 18	61644	70191828	1138	473707	67447247	1094	473707	0.01
**REGION 21	5875	8482737	1443	94148	2094884	356	38977	0.15
**REGION 22	28733	40286279	1402	1033991	10454987	363	1027058	0.15
**REGION 23	5933	8087730	1363	99839	2064587	347	47016	0.12
**REGION 24	51484	71812168	1394	1037866	16168823	314	961155	0.14
**REGION 27	20991	172325293	8209	56406152	43489527	2071	3863552	1.00
**REGION 28	7656	8730759	1140	165541	2516070	328	165541	0.11
**REGION 31	6415	9439060	1471	128315	2298518	358	78602	0.15
**REGION 34	64676	61728966	954	542837	17768877	274	80273	0.09
**TOTALS	404869	773910831	1911		256351175	633		0.17

773.9 SECS

256.4 SECS

DL/I Calls

▲ Examine TOTAL line

- ▶ Note total DL/I Call elapsed: 773.9 SECS
- ▶ Note total NOT IWAIT elapsed: 256.4 SECS
- ▶ Calculate total IWAIT elapsed: 517.5 SECS

▲ Note average NOT IWAIT time per call: 633 MCS/CALL

- ▶ If greater than 200 to 500 mcs., it is likely we have a tunable problem
 - Logging
 - MVS dispatching
 - Waits on locks (using IRLM prior to IMS 6.1)
 - Paging

DL/I Calls ...

▲ Examine NOT IWAIT average elapsed time by region

- ▶ Consistently over guideline? Suspect MVS dispatching, inadequate block size/BUFNO for monitor data set
- ▶ Inconsistently over guideline? Suspect logging, paging, selective MVS dispatching priority settings for dependent regions, locking waits (IRLM prior to IMS 6.1)

▲ What is dominant?

- ▶ IWAIT time? 517.5 SECS or 67% of DL/I call elapsed
- ▶ NOT IWAIT time? 256.4 SECS or 33% of DL/I call elapsed
 - NOT IWAIT average elapsed per call is 633 mcs.

DB2 Calls

- ▲ **The elapsed time for certain DB2 call are included in DL/I Call IWAIT time**
 - ▶ Commit Ph. 1, Commit Ph. 2, and TERM THRD calls are included in DL/I call IWAIT time
 - Subtract total DB2 call time for these calls from DL/I Call (Region Summary Reports) TOTAL and IWAIT elapsed times
 - Adjust Call Summary report for a PSB: Subtract the DB2 call timings from IOPCB total call elapsed

- ▲ **DB2 dispatching priority can affect CREATE THREAD performance**

- ▲ **Leave DB2 tuning to the DB2 folks**

Application Elapsed (non-Call Activity)

▲ Calculate (estimate) from the preceding reports



PROGRAM EXECUTION ELAPSED	1508.7	SECS
DL/I CALL ELAPSED	(773.9)	
DB2 CALL ELAPSED	N/A	
APPLICATION ELAPSED	<u>734.8</u>	SECS

Application elapsed (non-call activity) time

- ▶ GSAM reads and writes (BMP only)
- ▶ OS data set I/O
- ▶ Waits on MVS Dispatcher
- ▶ Page faults
- ▶ Excessive use of operating system services
- ▶ WFI and Pseudo-WFI waits on GU IOPCB

IDLE FOR INTENT & CHECKPOINT

IMS MONITOR ****REGION SUMMARY**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

			.....ELAPSED TIME.....			NOT IWAIT TIME (ELAPSED-IWAIT)		
	<u>OCCURRENCES</u>		<u>TOTAL</u>	<u>MEAN</u>	<u>MAXIMUM</u>	<u>TOTAL</u>	<u>MEAN</u>	<u>MAXIMUM</u>
<u>IDLE FOR INTENT</u>								
**REGION	4	1	406107	406107	406107			
**REGION	8	1	1876300	1876300	1876300			
**REGION	16	1	6622374	6622374	6622374			
**REGION	31	2	2041253	1020626	1376483			
**TOTALS		5	10946034	2189206				
			 10.9 SECS					
<u>CHECKPOINT</u>		1	1794077	1794077	1794077	1794077	1794077	1794077
			 1.8 SECS					

Idle for Intent

- ▲ **Reports elapsed time dependent regions were unable to schedule any work**
 - ▶ Causes
 - Insufficient contiguous pool space exists to schedule a transaction
 - REPORTS Report shows which pools
 - A DB is unavailable because a scheduled PSB has specified PROCOPT=E
 - A transactions class is not allowed by SCHED option in effect for a previous schedule failure

Checkpoint

▲ System checkpoint

- ▶ Can generate a large amount of logging activity
- ▶ When logging the recoverable portion of terminal control blocks, the DC latch is held
 - Can take a few seconds to tens of seconds, depending upon ...
- ▶ When taken during a monitor run, system checkpoint activity is the reason for some of the 'maximum' NOT IWAIT elapsed times reported by the monitor
- ▶ Resets the internal latch counters

Region Occupancy

IMS MONITOR *****REGION SUMMARY*****

TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

REGION OCCUPANCY

**REGION	1	51.8%
**REGION	3	17.6%
**REGION	4	41.9%
**REGION	5	1.3%
**REGION	6	40.3%
**REGION	8	10.7%
**REGION	10	5.4%
**REGION	14	42.5%
**REGION	16	6.0%
**REGION	17	40.1%
**REGION	18	54.7%
**REGION	21	7.2%
**REGION	22	31.2%
**REGION	23	6.9%
**REGION	24	42.2%
**REGION	26	100.0%
**REGION	27	90.5%
**REGION	28	7.4%
**REGION	31	7.8%
**REGION	34	40.9%

Region Occupancy

- ▲ **Low occupancy percentages may result in page faulting**
 - ▶ A likely cause of high NOT IWAIT average/call
 - ▶ Can result in increased contention for resources (increased probability of more concurrent TCB execution)
- ▲ **High occupancy percentages may result in transaction queuing**
- ▲ **Variable occupancy percentages indicate biased classing**
 - ▶ Classing applications to specific dependent regions
 - ▶ Prejudice ('hog' transactions)
- ▲ **The old "don't exceed 65% occupancy" guideline is probably obsolete for most large systems**

Region IWAIT

IMS MONITOR ****REGION IWAIT**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

		.....IWAIT TIME.....				
*REGION	14 OCCURRENCES	TOTAL	MEAN	MAXIMUM	FUNCTION	MODULE
SCHEDULING + TERMINATION						
	593	141885674	239267	1458274	NO MESSAGES	MSC
..SUB-TOTAL...	593	141885674	239267			
	1	3146	3146	3146	PSB=PSB64	BLR
	1	3805	3805	3805	PSB=PSB39	BLR
	8	26590	3323	4465	PSB=PSB112	BLR
	1	2925	2925	2925	PSB=PSB56	BLR
	1	2727	2727	2727	PSB=PSB59	BLR
	2	9067	4533	5120	PSB=PSB4	BLR
	6	20542	3423	4271	PSB=PSB77	BLR
	1	44206	44206	44206	PSB=PSB33	BLR
	1	47027	47027	47027	PSB=PSB98	BLR
	1	64527	64527	64527	PSB=PSB10	BLR
	1	37718	37718	37718	PSB=PSB25	BLR
	1	2523	2523	2523	PSB=PSB12	BLR
	1	3111	3111	3111	PSB=PAB48	BLR
..TOTAL...	619	142153588	229650			
DL/I CALLS	106	277055	2613	45587	DD=PSB89DB1	VBH

142.2 SECS SCHEDULING + TERMINATION TOTAL
 - 141.9 SECS SCHEDULING + TERMINATION SUB-TOTAL
 .3 SECS ELAPSED TIME FOR RGN 14 PSB LOAD

Region IWAIT ...

Previously, Scheduling + Termination elapsed time for the system was seen to be 16.9 SECS

- ▶ This amount of time is not considered significant for this example

When Scheduling + Termination is significant,

- ▶ The Region IWAIT reports contain the details of elapsed IWAIT time associated with scheduling
- ▶ The Latch Statistics Report give counts of latch contention incurred during scheduling

Types of Sched + Term IWAITs

BLR	Block Loader
INTENT	Dep. RGN could not be scheduled
NO MESSAGES	No Work
INT	Load INTENT LIST
PSB	Load the indicated PSB
DMB	Load the indicated DMB
SHMSG, LGMSG, QBLKS	Message Queue data set I/O

Latches related to Sched + Term

TERM	SCHD	TCTB	PSBP
DMBP	DDRB	PSBB	PDRP

Message Queue Pool Report

I M S M O N I T O R BUFFER POOL STATISTICS TRACE START 14:22:06 TRACE STOP 14:26:14

M E S S A G E Q U E U E P O O L

	14:22:06 START TRACE	14:26:14 END TRACE	DIFFERENCE
NUMBER OF LOCATE CALLS FROM QMGR	16258116	16315650	57534
NUMBER OF RECORD RELEASE CALLS FROM QMGR	5865870	5886050	20180
NUMBER OF LOCATE AND ALTER CALLS FROM QMGR	29417237	29519525	102288
NUMBER OF REQUESTS TO PURGE THE Q POOL	145	146	1
NUMBER OF ADDRESS TO DRN TRANSLATION REQUESTS	0	0	0
NUMBER OF READ REQUESTS	381136	382581	1445*
NUMBER OF WRITE REQUESTS (TOTAL)	81090	81296	206*
NUMBER OF WRITES DONE BY PURGE	10033	10052	19
NUMBER OF WAITS FOR PURGE COMPLETION	136	142	6*
NUMBER OF WAITS BECAUSE NO BUFFER AVAILABLE	0	0	0*
NUMBER OF WAITS FOR OTHER DECB TO READ THIS BUFFER	3114	3138	24*
NUMBER OF WAITS FOR OTHER DECB TO WRITE THIS BUFFER	614	617	3*
NUMBER OF WAITS FOR CONFLICTING END DEQ BUFFER REQ	0	0	0*
NUMBER OF PSBS UNCHAINED FROM BUFFERS	0	0	0
NUMBER OF CALLS TO QMGR. (TOTAL)	25770745	25864252	93507
NUMBER OF CALLS TO REPOSITION A LOST BUFFER	884	886	2
NUMBER OF CALLS TO ENQ A MESSAGE	3580569	3593094	12525
NUMBER OF CALLS TO DEQ ONE OR MORE MESSAGE	1661741	1667843	6102
NUMBER OF CALLS TO CANCEL INPUT OR OUTPUT	119668	119930	262

QUOTIENT : $\frac{\text{TOTAL NUMBER OF OSAM READS} + \text{OSAM WRITES} + \text{ALL IWAITS}}{\text{TOTAL NUMBER OF TRANSACTIONS}} = 0.26$ * = 1,684 waits
= 6.8 per sec

Message Queue Pool Report

▲ No. Requests to Purge the Q Pool:

- ▶ Occurs whenever a system checkpoint is taken
- ▶ Writes Q buffers to the queue data sets that contain message LRECLs that
 - Have never been written to the queue data sets **AND**
 - Two system checkpoints have taken place

▲ No. of Read Requests:

- ▶ Blocks read from the queue data sets containing messages to be processed
 - Counts indicate the system is unable to process messages using queue buffers only

▲ No. of Write Requests (total) & No. of Writes Done by Purge:

- ▶ For a well-tuned system these numbers should be equal
- ▶ Consider increasing the number of queue buffers if not equal

Message Format Buffer Pool

I M S M O N I T O R* BUFFER POOL STATISTICS TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

M E S S A G E F O R M A T B U F F E R P O O L

	14:22:06	14:26:14	
	START TRACE	END TRACE	DIFFERENCE
NUMBER OF P/F REQUESTS	3404779	3417285	12506
NUMBER OF I/F REQUESTS	6849575	6874822	25247
NUMBER OF I/F I/O'S	4408	4412	4
NUMBER OF TIMES POOL COMPRESS WOULD BE SUCCESSFUL	0	0	0
NUMBER OF DIRECTORY I/O OPERATIONS	1599	1599	0
NUMBER OF TIMES BLOCK WASHED FOR FRE	123	126	3
NUMBER OF TIMES P/F REQUEST IGNORED	33332	33541	209
NUMBER OF F/B REQUESTS	6785459	6810288	24829
NUMBER OF TIMES F/B REQUEST IGNORED	68	68	0
NUMBER OF TIMES I/F ON F/B QUEUE	6783888	6808762	24874
NUMBER OF TIMES I/F ON I/F QUEUE	33996	34203	207
NUMBER OF TIMES F/B ON I/F QUEUE	6785391	6810220	24829
NUMBER OF TIMES P/F ON I/F QUEUE	42345	42536	191
NUMBER OF TIMES P/F ON F/B QUEUE	3356203	3368470	12267
NUMBER OF TIMES THERE WAS NO DIR ENTR FOR A BLOCK	344	344	0
NUMBER OF TIMES I/O ERRORS POINT OR READ MACRO	0	0	0
NUMBER OF IMMED I/O REQUESTS WAITED DUE TO MAX I/O	142	142	0
NUMBER OF REQUESTS SATISFIED BY INDEX/DYNAMIC DIR	4336	4340	4

QUOTIENT : TOTAL NUMBER OF IMMEDIATE FETCH I/O'S + DIRECTORY I/O'S OPERATIONS = 0.00
 TOTAL NUMBER OF TRANSACTIONS

Message Format Buffer Pool

- ▲ **This pool is well-managed by IMS and is usually not a problem**
- ▲ **Number of I/F I/Os:**
 - ▶ No. of reads for blocks not in the buffer pool
- ▲ **No. of Directory I/O Operations:**
 - ▶ No. of reads for directory entries not in dynamic directory
- ▲ **No. of Times Block Washed for FRE:**
 - ▶ Counts indicate the number of FREs allocated cannot support the number of blocks that can be loaded into the pool
 - ▶ Additional FREs are dynamically created if needed
- ▲ **No. of Times There Was No Directory Entr for a Block:**
 - ▶ Count of directory entries requested that do not exist
- ▲ **No. of Immed I/O Requests Waited Due to Max I/O:**
 - ▶ Increase BUFNO= specification on formatlib DD statement

Communication Summary

IMS MONITOR ****COMMUNICATION SUMMARY**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

NODE OR LINE NUMBER	OCCURRENCES	.....ELAPSED TIME.....			NOT IWAIT TIME (ELAPSED-IWAIT)		
		TOTAL	MEAN	MAXIMUM	TOTAL	MEAN	MAXIMUM
V7N01038	3	14403	4801	9009	14403	4801	9009
AJ1NJBD	6	154270	25711	87204	154270	25711	87204
T01NV292	12	196980	16415	151639	196980	16415	151639
P9082016	1	194	194	194	194	194	194
V1N01714	3	82373	27457	81630	82373	27457	81630
T01NV173	10	106821	10682	58189	106821	10682	58189
AJ1NJGM	3	294339	98113	292928	294339	98113	292928
NL6G	1	223	223	223	223	223	223
VVTP0793	6	3010	501	1108	3010	501	1108
VIMS2590	6	4620	770	1987	4620	770	1987
TJ50	1	189	189	189	189	189	189
AF1NFAK	4	9523	2380	7610	9523	2380	7610
NCA6	3	51755	17251	44425	51755	17251	44425
KLS11140	3	85968	28656	84994	85968	28656	84994
T01NV12H	6	133400	22233	120931	133400	22233	120931
KLS11362	3	55387	18462	54582	55387	18462	54582
NI10	3	43316	14438	43065	43316	14438	43065
V1M36143	3	8052	2684	7012	8052	2684	7012
KLS11448	4	74650	18662	73377	74650	18662	73377
T9136093	3	2815	938	1870	2815	938	1870
TOMWC107	5	9961	1992	4788	9961	1992	4788
TOTAL	22917	381190101	16633		372043832	16234	

381.2 SECS

16.7 MS

372.0 SECS

Communication Summary

▲ Reports DC ITASK execution time

- ▶ IWAIT time is I/O activity to the message queue and formatlib data sets
- ▶ NOT IWAIT time includes
 - SENDs to VTAM
 - Movement of input messages to the HIOP
 - Input and output message editing
 - Placing input messages in a queue buffer. Retrieving output messages from the queue manager.
 - Related logging activity

▲ Average ITASK execution time (16.7 MS in this example) is likely to be unique to a given system

- ▶ Track the average over time. Major differences should be examined.

▲ Note total elapsed time: 381.2 SECS

Communication IWAIT

IMS MONITOR ****COMMUNICATION IWAIT**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

.....IWAIT TIME.....						
<u>NODE OR LINE NUMBER</u>	<u>IWAITS</u>	<u>TOTAL</u>	<u>MEAN</u>	<u>MAXIMUM</u>	<u>DDN/FUNC</u>	<u>MODULE</u>
TERM2	1	19239	19239	19239	DDNAME=SHMSG	QMG
TERM55	1	1782	1782	1782	DDNAME=SHMSG	QMG
TERM31	1	1928	1928	1928	DDNAME=LGMMSG	QMG
TERM10	1	2106	2106	2106	DDNAME=LGMMSG	QMG
TERM209	1	1819	1819	1819	DDNAME=SHMSG	QMG
TERM38	1	1812	1812	1812	DDNAME=SHMSG	QMG
TERM5	1	2094	2094	2094	DDNAME=LGMMSG	QMG
TERM291	1	30287	30287	30287	DDNAME=SHMSG	QMG
TERM4	1	1965	1965	1965	DDNAME=LGMMSG	QMG
TERM6	1	1821	1821	1821	DDNAME=LGMMSG	QMG
TERM087	2	71963	35981	65339	DDNAME=LGMMSG	QMG
TOTAL	812	9146269	11263			

9.1 SECS

Other Possible DDN/FUNC Values

CIOP
 SPAP
 DCB=DIR=mbrname
 DCB=BLK=mbrname
 QBLKS
 I/O=DIR=mbrname
 I/O=BLK=MBRNAME

Other Possible MODULE Values

DBH: OSAM I/O for message queues
 PMM: Message format pool space
 PRF: Message format block prefetch
 MFS: MFS directory/block I/O
 MSC: MPP init and scheduling
 SMN: Virtual storage management

Communications IWAIT

- ▲ **Reports timings for IWAITS incurred during DC ITASK execution**
 - ▶ Most common reasons for IWAITS are
 - Queue data set reads and writes (SHMSG, LGMSG, QBLKS)
 - MFS Format Library directory and format reads and DCB contention

- ▲ **Scan the report to obtain feel for which data sets are incurring I/O activity**
 - ▶ Take tuning action if activity is significant

- ▲ **Note the total IWAIT time at report end: 9.1 SECS**

Transaction Queuing

IMS MONITOR ****TRANSACTION QUEUING**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

TRANSACTION	NUMBER	NUMBER	..ON QUEUE WHEN SCHEDULED..			DEQUED
	DEQUED	SCHEDS.	MINIMUM	MEAN	MAXIMUM	MEAN
TRAN1	77	70	0	0.00	0	1.10
TRAN2	193	130	0	0.01	1	1.48
TRAN4	86	82	0	0.00	0	1.04
TRAN7	822	821	0	0.03	3	1.00
TRAN8	144	144	0	0.01	1	1.00
TRAN9	82	79	0	0.00	0	1.03
TRAN10	494	415	0	0.03	2	1.19
TRAN11	27	25	0	0.04	1	1.08
TRAN12	13	13	0	0.00	0	1.00
TRAN13	73	70	0	0.00	0	1.04
TRAN14	145	131	0	0.01	1	1.10
TRAN15	568	565	0	0.02	1	1.00
TRAN16	481	425	0	0.02	2	1.13

Transaction Queuing

- ▲ **Reports schedule and dequeue counts for each transaction that was processed during the monitor interval**
 - ▶ Quick reschedule, WFI, and pseudo-WFI can reduce number of schedules

- ▲ **Useful for determining if transaction queuing is occurring**
 - ▶ "On Queue When Scheduled: Minimum": Count greater than zero means a transaction queue existed for the life of this monitor interval. Report almost always reports a zero count.
 - ▶ "On Queue When Scheduled: Maximum": Count indicates queuing did occur.
 - Distribution Reports show the queue counts
 - Investigate APPLCTN and TRANSACT definitions
 - Determine the number of dependent regions eligible to process this transaction and at what class priority

PROGRAM SUMMARY

IMS MONITOR ****PROGRAM SUMMARY**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

PSBNAME	NO. SCHEDS.	TRANS. DEQ.	CALLS CALLS	/TRAN	I/O IWAITS	I/O IWAITS /CALL	TRAN. DEQD. /SCH.	CPU TIME /SCHED.	ELAPSED TIME /SCHED.	SCHED.TO 1ST CALL /SCHED.	ELAPSED TIME /TRANS.
PSB1	70	77	36421	473.0	1644	0.0	1.1	130100	406148	8954	369225
PSB2	129	193	83629	433.3	3288	0.0	1.4	197822	499136	81554	333619
PSB3	1		7398	-	19182	2.5	0.0	10010	163039661	1338549	
PSB4	82	86	3661	42.5	1925	0.5	1.0	22374	458423	9810	437101
PSB5	1	0					0.0	10010	247929124	0	
PSB6	1	0	518	-	206	0.3	0.0	10010	128199921	108574	
PSB7	842	843	39580	46.9	7114	0.1	1.0	29202	150758	10660	150579
PSB8	144	144	5791	40.2	1009	0.1	1.0	27706	109582	10651	109582
PSB9	79	82	1755	21.4	302	0.1	1.0	11757	37542	10082	36168
PSB10	415	494	4101	8.3	2328	0.5	1.1	13057	79389	8994	66693
PSB11	25	27	239	8.8	173	0.7	1.0	11157	70249	10102	65046
PSB13	70	73	6253	85.6	951	0.1	1.0	42978	196685	10000	188602
PSB14	131	145	1781	12.2	1255	0.7	1.1	11039	134576	10842	121582
PSB15	565	568	33431	58.8	4928	0.1	1.0	34488	146513	10921	145739
PSB16	425	481	4790	9.9	1048	0.2	1.1	7828	35868	9975	31692
**TOTALS	6103	6466	404869	62.6	70185	0.1	1.0	23453	247208	12994	233329

6103 X 247.2 MS = 1508.7 SECS

Adjust PSB Elapsed for Apparent Inactivity

	<u>NO.</u> <u>SCHEDES</u>	<u>CALLS</u>	<u>ELAP TIME</u> <u>/SCHED</u>	<u>TOTAL PSB</u> <u>SCHEDES ELAP</u>	<u>TOTAL PSB</u> <u>CALL ELAP</u>	<u>ADJUSTMENT</u>
PSB5	1	-0-	247.9 SECS	247.9 SECS	-0-	247.9 SECS
PSB6	1	518	128.2	128.2	1.2	<u>127.0</u>
TOTAL ADJ						374.9

- These programs should be investigated to justify the measurements
- Make the adjustment if appropriate

Total PSB Elapsed	1,508.7	SECS	6,103	SCHEDES
Adjustment	<u>- 374.9</u>		<u>- 2</u>	
Adjusted PSB Elapsed	1,133.8	SECS	6,101	SCHEDES
DL/I Call Elapsed	<u>- 773.9</u>		N/A	
Application Elapsed (Adj)	359.9	SECS		

Results of First Pass

SYSTEM: IMSA

LOCK MGR: PI

DATE/TIME: 97122 14:22:06

MONITOR INTERVAL

247.9 SECS

TRAN RATE

26.0 TRN/SEC

TRANSACTION QUEUING

	<u>LATCH</u>	<u>NO.</u>
LATCH CONFLICTS	ACTL	3,761
	LOGL	1,430
	OTHER	

REMEMBER, COUNTS WERE
RESET BY SYSTEM CHECKPOINT

<u>ELAPSED TIME</u>	<u>TOTAL</u>	<u>PCT</u>	<u>PCT</u>	<u>COMPARATIVE STATS</u>
IDLE FOR INTENT	2.2 SECS		0.0 %	NEGLIGIBLE
COMM ELAP	381.2		30.4	16.7 MS/ITASK
DL/I CALL ELAP	773.9	100 %	61.7	1633/SEC 1.9 MS/CALL
TOTAL IWT ELAP	517.5	67 %	41.3	283 IWTS/SEC 1.3 MS/CALL
TOTAL NOT IWT ELAP	256.4	33	20.5	663 MCS/CALL
DB2 SVC & CMD CALLS	-		-	XXX /SEC XXX MS/CALL
DB2 NORMAL CALLS	-		-	XXX /SEC XXX MS/CALL
SCHED & TERM	17.0		1.4	2.8 MS/SCHED
SCHED TO FIRST CALL	79.3		6.3	13.0 MS/SCHED
IMS ACTIVITY	1,253.6 SECS		100.0 %	
APPLN ELAPSED (ADJUSTED)	359.9			22% OF TOTAL SYSTEM
TOTAL SYSTEM ELAPSED	1,613.5 SECS			

Results of First Pass

- ▲ **ACTL and LOGL latch contention may be high**
 - ▶ What is frequency of system checkpoints during peak workload?

- ▲ **DL/I call elapsed is 61.7% of IMS activity**
 - ▶ IWAIT time is twice that of NOT IWAIT time
 - ▶ NOT IWAIT average is 663 MCS per call
 - Check dependent region dispatching priorities. Especially regions 1, 17, and 18.
 - Check logger statistics (X'4507' log record) for log buffer waits

- ▲ **Sched to First DL/I call is on the high side (13.0 MS/sched)**
 - ▶ Analyze program load setup
 - ▶ Evaluate compile/runtime options

Results of First Pass

- ▲ **It places the tuning task in perspective**
 - ▶ Where is the system spending its time?
- ▲ **Reveals some 'performance facts' that require further analysis and/or tuning actions**

IMS Technical Conference
October 23 - 27, 2000



Using the Program Summary Report



Reports for Analysis

- PSB Elapsed Execution →
 - Region Summary: DL/I Calls
 - DB2 Service and Command Calls
 - DB2 Normal Calls
 - Program Summary**
 - Program I/O Report
 - DB Buffer Pool Reports (OSAM and/or VSAM)
 - Call Summary
- Scheduling and Termination →
 - Region Summary: Scheduling and Termination
 - Program Summary**
 - Region IWAIT Reports
- Schedule to First DL/I Call →
 - Region Summary: Schedule to First Call
 - Program Summary**
- Communication Elapsed →
 - Message Queue Pool Report
 - Communication IWAIT Report
 - Message Format Buffer Pool
 - Latch Conflict Statistics
 - Transaction Queuing



PSB Elapsed Execution



Program Summary

▲ Reports on activity by PSB

▲ Find PSBs with most elapsed time for DL/I and DB2 call activity

- ▶ Select PSBs based on dominance of IWAIT or NOT IWAIT time
 - IWAIT dominant: Select PSBs based on number of IWAITs
 - NOT IWAIT dominant: Select PSBs based on number of calls
- ▶ Calculate total call elapsed time from Call Summary report for the selected PSBs
 - Accumulate until have a respectable %'age of adjusted PSB elapsed schedule time
- ▶ Analyze selected PSBs starting with corresponding Call Summary report

Program Summary

PSBNAME	NO. SCHEDS.	TRANS. DEQ.	CALLS	I/O /TRAN	I/O IWAITS	I/O /CALL	TRAN. /SCH.	CPU /SCHED.	ELAPSED /SCHED.	SCHED. TO /SCHED.	ELAPSED /TRANS.
PSB1	70	77	36421	473.0	1644	0.0	1.1	130100	406148	8954	369225
PSB2	129	193	83629	433.3	3288	0.0	1.4	197822	499136	81554	333619
PSB3	1	0	7398	-	19182	2.5	0.0	10010	163039661	1338549	
PSB4	82	86	3661	42.5	1925	0.5	1.0	22374	458423	9810	437101
PSB5	1	0					0.0	10010	247929124	0	
PSB6	1	0	518	-	206	0.3	0.0	10010	128199921	108574	
PSB7	842	843	39580	46.9	7114	0.1	1.0	29202	150758	10660	150579
PSB8	144	144	5791	40.2	1009	0.1	1.0	27706	109582	10651	109582
PSB9	79	82	1755	21.4	302	0.1	1.0	11757	37542	10082	36168
PSB10	415	494	4101	8.3	2328	0.5	1.1	13057	79389	8994	66693
PSB15	565	568	33431	58.8	4928	0.1	1.0	34488	146513	10921	145739
PSB16	425	481	4790	9.9	1048	0.2	1.1	7828	35868	9975	31692
**TOTALS	6103	6466	404869	62.6	70185	0.1	1.0	23453	247208	12994	233329

PSBNAME	NO. SCHEDS	NO. CALLS	I/O IWAITS	ELAPSED TIME /SCHED	PSB ELAP	% TOTAL PSB ELAP
PSB1	70	36,421	1,644	406148 MCS	28.4 SECS	3.0%
PSB2	129	83,629	3,288	499136	64.4	6.0
PSB3	1	7,398	19,182	163039661	163.0	14.4
PSB7	842	39,580	7,114	150758	126.9	11.2
PSB10	415	4,101	2,328	79389	32.9	2.9
PSB15	565	33,431	4,928	146513	82.8	7.3
		204,560	38,484		498.4 SECS	44.8%
		50.5% OF CALLS	54.8% OF TOT IWTS		44.8% OF ADJ PSB ELAP	

Call Summary PSB Analysis

- ▲ **Find the PCBs that are consuming the most call elapsed time**
 - ▶ Within these PSBs, find the calls/PCBs that are consuming the most elapsed time
 - Separate call elapsed into IWAIT and NOT IWAIT timings
 - Analyze the selected calls/PCBs from a tuning perspective

- ▲ **The PCBs consuming the most elapsed time point us to the DB PCBs of interest within the Program I/O Reports**

Call Summary - PSB3 (BMP)

IMS MONITOR ****CALL SUMMARY**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

PSB NAME	PCB NAME	CALL FUNC	LEV NO. SEGMENT	STAT CODE	CALLS	IWAITS	IWAITS/ CALL	..ELAPSED TIME..		NOT IWAIT TIME	
								MEAN	MAXIMUM	MEAN	MAXIMUM
PSB3	I/O PCB	CHKP	()		31	189	6.09	26377	61297	12712	42903
		LOG	()		310	0	0.00	742	75482	742	75482
		I/O PCB SUBTOTAL			341	189	0.55	3073		1830	
	PSB3DB2	ISRT	(02) TRANRTE		3027	56	0.01	1941	200579	1831	200579
		ISRT	(01) TRANROOT		36	9	0.25	4358	29540	2364	7094
		GU	(00)	GE	36	12	0.33	8225	57002	3166	57002
		REPL	(01) TRANROOT		35	0	0.00	822	3512	822	3512
		GU	(01) TRANROOT		35	0	0.00	1054	11196	1054	11196
		DL/I PCB SUBTOTAL			3169	77	0.02	2018		1832	
	PSB3DB1	GU	(01) SCRCHPAD		3026	4946	1.63	23933	578509	3278	520010
		GU	(00)	GE	1	2	2.00	22173	22173	1282	1282
		DL/I PCB SUBTOTAL			3027	4948	1.63	23933		3277	
	PSB3DB3	GU	(01) DB3ROOT		37	12007	324.51	1529514	56406152	107264	3863552
		GN	(00)	GB	1	1142	1142.00	4087572	4087572	351127	351127
		GN	(01) DB3ROOT		823	819	0.99	3099	22523	1115	18879
		DL/I PCB SUBTOTAL			861	13968	16.22	73438		6083	
	PSB TOTAL				7398	19182	2.59	19345		2918	

7398 CALLS X 19.4 MS/CALL = 143.5 SECS TOTAL PSB CALL ELAPSED

7398 CALLS X 2.9 MS/CALL = 21.6 SECS TOTAL PSB NOT IWAIT ELAPSED

Call Summary - PSB3 ...

- ▲ **Analyze these two calls to select possible tuning actions**
 - ▶ Analyze the selected DBDs for possible tuning actions

- ▲ **The two calls point at DB PCBs of PSB3DB1 and PSB3DB3**
 - ▶ Find the DDNAMEs associated with these DB PCBs by looking at the Program I/O Report for PSB3

- ▲ **What about NOT IWAIT time per call?**
 - ▶ NOT IWAIT average for all calls is consistently above guideline of 200 to 500 MCS

	<u>CALLS</u>	<u>MEAN CALL ELAPSED</u>	<u>TOTAL CALL ELAPSED</u>	<u>% PSB CALL ELAPSED</u>	<u>MEAN NOT IWT</u>	<u>TOTAL NOT IWT</u>
GU (01) SCRCHPAD	3026	23.9 MS	72.4 SECS	50.5%	3.3 MS	9.9 SECS
GU (01) DB3ROOT	37	1529.5	56.6	39.4	107.3	4.0
				<u>89.9%</u>		

Program I/O

IMS MONITOR ****PROGRAM I/O*** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14 PAGE 0104

.....IWAIT TIME.....							
PSBNAME	PCB NAME	IWAITS	TOTAL	MEAN	MAXIMUM	DDN/FUNC	MODULE
PSB3	PSB3DB1	2865	47733904	16661	129201	DB1DB	VBH
		2083	14790495	7100	91334	DB1IX	VBH
	PCB TOTAL	4948	62524399	12636			
	I/O PCB	166	350945	2114	5269	DB2DB	VBH
		23	72652	3158	20337	DB2IX	VBH
	PCB TOTAL	189	423597	2241			
	PSB3DB2	71	525609	7402	38252	DB2DB	VBH
		6	62877	10479	34396	DB2IX	VBH
	PCB TOTAL	77	588486	7642			
	PSB3DB3	19	105500	5552	27646	DB3IX	VBH
		13949	57887258	4149	127107	DB3DB	VBH
	PCB TOTAL	13968	57992758	4151			
	PSB TOTAL	19182	121529240	6335			

PCB NAME	TOTAL IWAIT TIME	DDNAME
PSB3DB1	47.7 SECS	DB1DB
	14.8	DB1IX
PSB3DB3	57.9	DB3DB
TOTAL	120.4 SECS	

Selected DDNAMES are

- ▶ 99% of total IWAIT time
- ▶ Identify which DB buffer pools to tune
- ▶ Identify portion of DASD subsystem to analyze

Program I/O Report PSB Analysis

- ▲ **Find the DB PCBs that the Call Summary analysis indicated were consuming the most IWAIT time**
 - ▶ With each DB PCB, note which DDNAMEs have the most elapsed IWAIT time
 - These are the DDNAMEs to analyze for possible tuning actions
 - These DDNAMEs identify which DB bufferpools to analyze for possible tuning actions

Programs By Region

IMS MONITOR ****PROGRAMS BY REGION**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

	<u>OCCURRENCES</u>	<u>ELAPSED EXECUTION TIME</u>			<u>SCHEDULING END TO FIRST CALL</u>		
		<u>TOTAL</u>	<u>MEAN</u>	<u>MAXIMUM</u>	<u>TOTAL</u>	<u>MEAN</u>	<u>MAXIMUM</u>
**REGION _19							
**REGION 20							
**REGION _21							
PSB7	149	16176646	108568	510019	1502959	10086	29485
REGION TOTALS	149	16176646	108568		1502959	10086	
**REGION _22							
PSB8	95	11212746	118028	580122	953396	10035	71733
PSB15	401	58472104	145815	2677139	4203649	10482	197859
PSB24	4	1369070	342267	580432	28952	7238	8501
REGION TOTALS	500	71053920	142107		5185997	10371	
**REGION _23							
PSB7	145	15413201	106297	670779	1550726	10694	25749
REGION TOTALS	145	15413201	106297		1550726	10694	
**REGION _24							

Programs By Region ...

- ▲ **Identifies PSB activity by region. Can be useful for analysis of some PSBs**
 - ▶ WFI and BMP PSBs of interest
 - ▶ For analyzing activity by application when applications are classed by region

- ▲ **Given a region number for a PSB of interest, find the corresponding Region IWAIT Report**
 - ▶ Region IWAIT Report summarizes IWAITS by DDNAME
 - Detect DDNAMES that are associated with the most IWAIT elapsed time to determine which DB buffer pools to analyze and tune

Region IWAIT

IMS MONITOR ****REGION IWAIT**** TRACE START 122 14:22:06 TRACE STOP 122 14:26:14

.....IWAIT TIME.....

*REGION	21 OCCURRENCES	TOTAL	MEAN	MAXIMUM	FUNCTION	MODULE
SCHEDULING + TERMINATIO						
	150	228819146	1525460	4003884	NO MESSAGES	MSC
...SUB-TOTAL...	150	228819146	1525460	4003884		
...TOTAL...	150	228819146	1525460	4003884		

DLI CALLS

418	3026345	7239	64904	DD=PSB7DB1	VBH
10	65258	6525	31139	DD=PSB7DB2	VBH
10	22717	2271	5201	DD=PSB7DB3	VBH
34	182988	5382	31251	DD=PSB7DB4	VBH
35	349037	9972	37947	DD=PSB7DB5	VBH
69	367562	5326	48147	DD=PSB7IX1	VBH
52	207701	3994	27697	DD=PSB7DB6	VBH
26	136468	5248	37271	DD=PSB7IX2	VBH
24	74403	3100	23230	DD=PSB7IX3	VBH
32	531109	16597	36234	DD=PSB3DB7	VBH
58	467697	8063	40931	DD=PSB3IX7	VBH
12	34186	2848	4972	DD=SHMSG	QMG
31	57002	1838	5025	DD=PSB7IX4	VBH

...TOTAL... 924 6387853 6913

6.4 SECS

VSAM Buffer Pool

V S A M B U F F E R P O O L

```

FIX INDEX/BLOCK/DATA          Y/Y/Y
SHARED RESOURCE POOL ID      XXXX
SHARED RESOURCE POOL TYPE    D
SUBPOOL ID                    3
SUBPOOL BUFFER SIZE          4096
NUMBER HIPERSPACE BUFFERS    0
TOTAL BUFFERS IN SUBPOOL     2000

```

	14:22:06	14:26:14	
	START TRACE	END TRACE	DIFFERENCE
NUMBER OF RETRIEVE BY RBA CALLS RECEIVED BY BUF HNDLR	155044648	155500666	456018
NUMBER OF RETRIEVE BY KEY CALLS	4248676	4255191	6515
NUMBER OF LOGICAL RECORDS INSERTED INTO ESDS	137	138	1
NUMBER OF LOGICAL RECORDS INSERTED INTO KSDS	297190	287669	479
NUMBER OF LOGICAL RECORDS ALTERED IN THIS SUBPOOL	7161204	7200515	39311
NUMBER OF TIMES BACKGROUND WRITE FUNCTION INVOKED	774	774	0
NUMBER OF SYNCHRONIZATION CALLS RECEIVED	719830	722038	2208
NUMBER OF WRITE ERROR BUFFERS CURRENTLY IN THE SUBPOOL	0	0	0
LARGEST NUMBER OF WRITE ERRORS IN THE SUBPOOL	0	0	0
NUMBER OF VSAM GET CALLS ISSUED	104940125	105160481	220356
NUMBER OF VSAM SCHBFR CALLS ISSUED	2315123	2325169	10046
NUMBER OF TIMES CTRL INTERVAL REQUESTED ALREADY IN POOL	100357240	100552978	195738
NUMBER OF CTRL INTERVALS READ FROM EXTERNAL STORAGE	8067276	8104848	37572
NUMBER OF VSAM WRITES INITIATED BY IMS/ESA	1429211	1434452	5241
NUMBER OF VSAM WRITES TO MAKE SPACE IN THE POOL	11	11	0
NUMBER OF VSAM READS FROM HIPERSPACE BUFFERS	0	0	0
NUMBER OF VSAM WRITES TO HIPERSPACE BUFFERS	0	0	0
NUMBER OF FAILED VSAM READS FROM HIPERSPACE BUFFERS	0	0	0
NUMBER OF FAILED VSAM WRITES TO HIPERSPACE BUFFERS	0	0	0

VSAM Buffer Pool Report

- ▲ The preceding report is associated with the DDNAMES selected from the Program I/O report (PSB3)
- ▲ RETRIEVE BY KEY calls in a shared resource type of D
- ▲ LOGICAL RECORDS INSERTED INTO ESDS
- ▲ TIMES BACKGROUND FUNCTION INVOKED
- ▲ VSAM SCHBFR CALLS ISSUED
- ▲ TIMES CONTROL INTERVAL REQUESTED ALREADY IN POOL & CONTROL INTERVALS READ FROM EXTERNAL STORAGE
- ▲ VSAM WRITES INITIATED BY IMS/ESA
- ▲ VSAM WRITES TO MAKE SPACE IN THE POOL
- ▲ HIPERSPACE statistics

Data Base Buffer Pool Report

I M S M O N I T O R BUFFER POOL STATISTICS TRACE START 135 14:00:03 TRACE STOP 135 14:05:04

D A T A B A S E B U F F E R P O O L

FIX PREFIX/BUFFERS N/N
 SUBPOOL ID
 SUBPOOL BUFFER SIZE 4096
 TOTAL BUFFERS IN SUBPOOL 250

	8:15:01	8:20:00	
	START TRACE	END TRACE	DIFFERENCE
NUMBER OF LOCATE-TYPE CALLS	13673777	13753770	79993
NUMBER OF REQUESTS TO CREATE NEW BLOCKS	3	3	0
NUMBER OF BUFFER ALTER CALLS	894341	897346	3005
NUMBER OF PURGE CALLS	103969	104943	974
NUMBER OF LOCATE-TYPE CALLS, DATA ALREADY IN OSAM POOL	12762469	12837560	75091
NUMBER OF BUFFERS SEARCHED BY ALL LOCATE-TYPE CALLS	15979736	16072757	93021
NUMBER OF READ I/O REQUESTS	789611	794192	4581
NUMBER OF SINGLE BLOCK WRITES BY BUFFER STEAL ROUTINE	473	473	0
NUMBER OF BLOCKS WRITTEN BY PURGE	208284	209907	1623
NUMBER OF LOCATE CALLS WAITED DUE TO BUSY ID	609	612	3
NUMBER OF LOCATE CALLS WAITED DUE TO BUFFER BUSY WRT	4	4	0
NUMBER OF LOCATE CALLS WAITED DUE TO BUFFER BUSY READ	0	0	0
NUMBER OF BUFFER STEAL/PURGE WAITED FOR OWNERSHIP RLSE	1	1	0
NUMBER OF BUFFER STEAL REQUESTS WAITED FOR BUFFERS	0	0	0
TOTAL NUMBER OF I/O ERRORS FOR THIS SUBPOOL	0	0	0
NUMBER OF BUFFERS LOCKED DUE TO WRITE ERRORS	0	0	0

QUOTIENT : $\frac{\text{TOTAL NUMBER OF OSAM READS} + \text{OSAM WRITES}}{\text{TOTAL NUMBER OF TRANSACTIONS}} = 0.00$

Data Base Buffer Pool

- ▲ **Just a brief discussion on what to look at**
- ▲ **REQUESTS TO CREATE NEW BLOCKS**
- ▲ **LOCATE-TYPE CALLS, DATA ALREADY IN OSAM POOL & READ I/O REQUESTS**
- ▲ **SINGLE BLOCK WRITES BY BUFFER STEAL ROUTINE & BLOCKS WRITTEN BY PURGE**
- ▲ **LOCATE CALLS WAITED**
 - ▶ DUE TO BUSY ID
 - ▶ DUE TO BUFFER BUSY WRT
 - ▶ DUE TO BUFFER BUSY READ
- ▲ **BUFFER STEAL/PURGE WAITED FOR OWNERSHIP RLSE**
- ▲ **BUFFER STEAL REQUESTS WAITED FOR BUFFERS**



Summary



Summary

- ▲ **We've covered most of the monitor reports in some amount of detail**
- ▲ **What to look for in the various reports**
 - ▶ Included were some performance guidelines and possible tuning actions
- ▲ **Placed the various activities and functions of the system into an elapsed time perspective**
 - ▶ Objective is to spend our analysis & tuning efforts most effectively