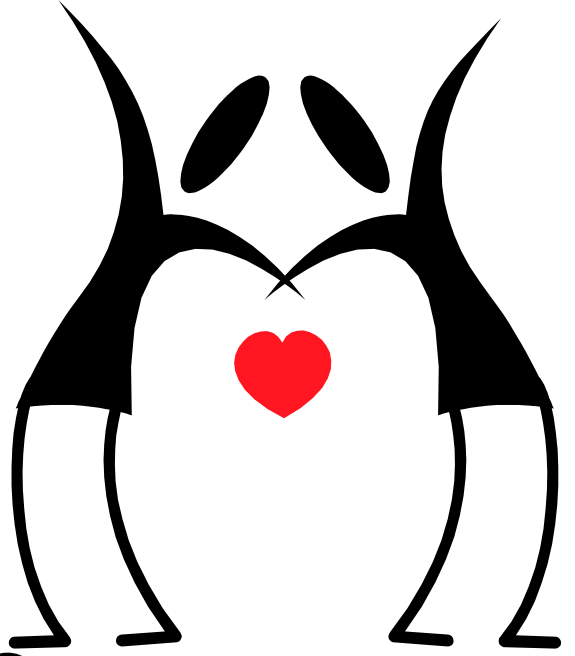
SHARE – Orlando, August 12, 2015
Session 17396



Holistic CICS Performance and Capacity Management

By Ivan Gelb

Think *Faster* with Gelb Information

Any questions? Email to: ivan@gelbis.com; Call: 732-303-1333

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Agenda

- Your Questions @Anytime
- Fundamentals
- Performance Management
- Capacity Management
- Top 5s
- Examples

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Fundamentals

- Methodology
- Service policy (WLM) & PR/SM
- Metrics starter set
- Monitoring / analysis levels
- In case you missed these…

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Methodology

1. Set / document service level goals (agreements once you are prepared)
2. Collect measurements
3. Analyze and report
4. If goals met:
   a) Develop a tuning idea for performance/capacity improvement, make just one change, loop back to 2
   b) Or, just loop back to 2 if all is well for now
5. If goals unmet: Develop a tuning idea, make just one change, loop back to 2

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Service policy (WLM) & PR/SM

- Be aware of PR/SM LPARs and the defined weights (drive CPU capacity allocations)
- Workload Manager (WLM) service policy
  a) Service classes (fewest = best) with importance scale of 1 – 5 + SYSTEM + STC + Discretionary
  b) CPU and STORAGE Critical attribute
  c) Report classes –

Examples: Multiple regions in various combinations, an entire applications, groups of transactions (By importance?), single transactions (like canaries in mines?)

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Metrics Starter Set

- CPU: total, average, by LPARs, by region, for a workload, single transaction,…etc…
- TS I/Os
- TD I/Os
- VSAM I/Os
- DBMS I/S
- Main storage management
- Waits by cause: CPU, I/O, thread, task class, …etc…

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Monitoring / Analysis Levels

- Entire Sysplex or one LPAR
- CICS Plex
- Selected regions
- By CICS application
- Groups of CICS transactions: (a) homogeneous, (b) small, (c) medium, (d) large, (e) XL, etc…
- Single transactions which can be indicators of overall system health

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In Case You Missed These…

- CICS Extreme Performance.
  By Ed Addison
- CICS TS V5 Performance Improvements.
  By Martin Cocks
- Search SHARE proceedings for:
  a) "Mining Performance Gold"
  b) "Exploiting the OTE"
  c) "CICS Performance A2Z"
  d) "CICS Performance Management Best Practices"

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CICS Extreme Performance -1

And the answer is……

- It looks like the LPAR is about 50% busy when everything is fine. And it is 100% busy when the problem happens. Can that cause transactions to suddenly use 33% more CPU?
- Clues point us to IYNXJ. Let's take a look at the SMF110 data there to see what suddenly started using CPU.

CICS Extreme Performance - 2

Start Interval	Tran	#Tasks	Avg Response Time	Avg Suspend Time	Avg Dispatch Time	Avg User CPU Time	Total QR Disp Time	Avg QR Disp Time	Total QR CPU Time	Total KY8 Disp Time	Avg KY8 Disp Count	Total L8 CPU Time
07:08:11	CECI	1	245.4272	245.4141	.0131	.0046	.0131	.0131	.0046	.0000	0	.0000
07:09:58	SOAK	12	.0836	.0302	.0534	.0485	.0153	.0013	.0042	.6260	3	.5773
07:09:59	SOAK	19	.0771	.0241	.0530	.0484	.0171	.0009	.0061	.9897	3	.9129
07:10:00	SOAK	17	.0972	.0345	.0627	.0482	.0299	.0018	.0062	1.0355	3	.8134
07:10:01	SOAK	19	.0823	.0265	.0559	.0490	.0240	.0013	.0069	1.0377	4	.9240
07:10:02	SOAK	19	.0847	.0299	.0548	.0486	.0213	.0011	.0063	1.0202	4	.9172
07:10:03	SOAK	18	.0871	.0309	.0562	.0475	.0142	.0008	.0060	.9971	3	.8497
07:10:04	SOAK	19	.0796	.0257	.0539	.0486	.0234	.0012	.0062	1.0008	4	.9174

- This is a slightly tweaked DISPSUM form summarizing on 1-second intervals in IYNXJ.
- At exactly 07:09:58, SOAK transactions began.
- They are using a total of about .9 seconds of CPU per second, almost a whole processor. So that is why IYNXJ suddenly started using about 1 processors worth of CPU.

CICS TS V5 Performance Improvements

Hardware Data (DSW)

	30 AORs	10 AORs	Delta
Execution Samples	2487298	2201099	-11%
Instruction First Cycle (IFC)	379000	371470	-2%
Micro Seconds per transaction	628.34	556.43	-11%
Cycles per instruction	6.53	5.90	-10%
MIPS per CP	797	882	+10%
Data cache misses (samples)	744894	608550	-18%
Instruction cache miss includes TLB miss	90483	66626	-26%
% Cycles used by TLB misses	6.82	5.94	-13%
Relative Nest Intensity (RNI)	0.48	0.34	

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123

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Performance Management - 1

An Ongoing Analysis Outline / Critical Success Factors:

- Document Service Level Agreements or Goals
- Collect Short and long term performance data
- Customize All system components (z/OS, CICS, MQ, DB2,…) to maintain / protect performance of business critical applications
- Performance management and capacity management are coordinated symbiotic functions

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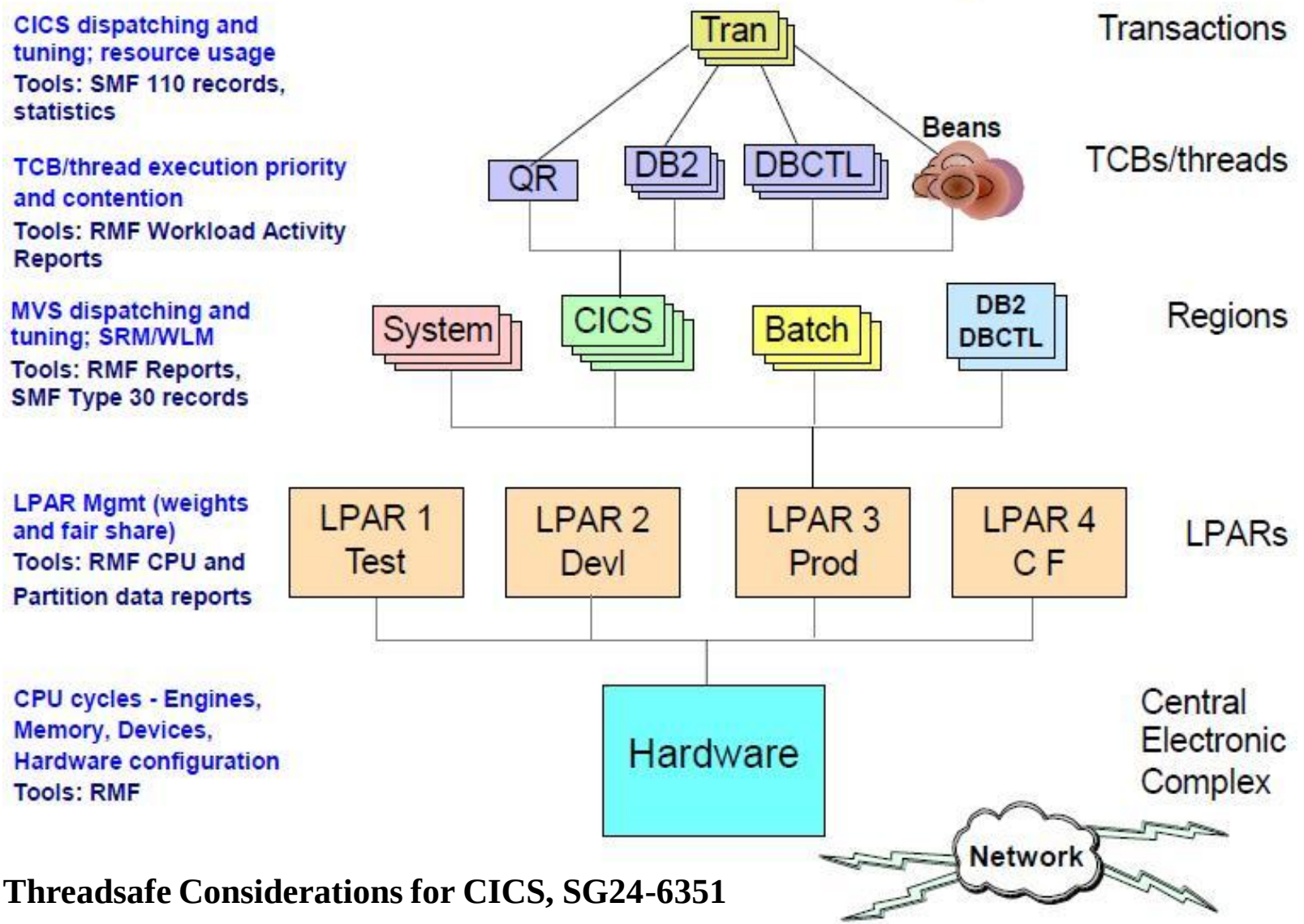
Performance Management - 2

Performance Hierarchy



Source: Threadsafe Considerations for CICS, SG24-6351

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Measurement Data Sources

- **Resource Measurement Facility (RMF)**
  - System wide resource level details: CPU disks, storage, workload performance, and summary
- **System Management Facility (SMF)**
  - Address space level details for: batch, STC, CICS, etc. + resource level details/address space
  - VSAM file and DB2 object level activity details
- **CICS end-of-day and interval statistics**
  - CICS Region level statistics and resource counters for: CPU, IO, storage, transactions, connections, etc…
- **CICS Monitoring Facility (CMF)**
  - Transaction level details. **All** the details!

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Capacity Management

- Successful performance management a pre-requisite for successful capacity management
- Methodology:
  1. Collect, analyze, report metrics
  2. Collect, maintain business activity forecasts
  3. Predict capacity requirements
  4. Ongoing reports of actual versus forecasts
     Reasonable goal is +/- 10% accuracy

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Capacity Management Forecasting

- DY (do it yourself) versus commercial tools predict the same basic metrics: utilization, activity rates, response time, etc…
- DY forecasting methodologies:
  a) m/m/1 based modeling and/or
  b) m/n/1 based modeling
- Commercial tools categories:
  - Analytical models
  - Simulation models

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Top 5s

- Reasons for performance management
- Root causes
- Performance tuning recommendations
- Excuses for doing nothing

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Top 5 Reasons for Performance Management

1. Meet or exceed Service Level Agreements.
2. Manage and control costs.
3. Assure scalability of systems when combined with capacity management.
4. Insure that computer resources are aligned with the business priorities.
5. Reduce computer resource requirements.

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Top 5 “Root Causes”

1. Utilization levels of one or more resource:
   CPU, I/O device , buffers, strings, ENQ activity, Application designed controls, etc…
2. “Cache Bashing” = competition for it
   a) CPU Instructions
   b) CPU Data
   c) I/O subsystem caches
   d) Buffer pools
3. HUE – High Utilization Effect (like MP factors)
4. LUE – Low Utilization Effect
5. Other subsystems: DB2, IMS, MQ

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Top 5 Performance Tuning Recommendations

1. Insure that PR/SM and Workload Manager (WLM) Service Policy provide proper priority for processor access.
2. Minimize the number of production CICS regions.
3. Turn off all CICS traces.
4. Tune Temporary Storage and Transient Data to reduce/eliminate physical I/Os.
5. Tune file I/Os via data-in-memory techniques and use data tables (CICS or User maintained).

Note: For additional detailed recommendations, please see SHARE Proceedings for "CICS Performance Management Best Practices" and "Mining Performance Gold From CICS Statistics"

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Top 5 Excuses for Doing Nothing

1. All must be well because nobody complains
2. We always did it this way
3. Busy doing other stuff
4. Do not have tools
5. We already have plan to buy more…

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Examples

- Processor analysis
- I/Os analysis

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Processor Utilization Governors

- **Three** dispatchers involved in making physical processor time available to a CICS task:
  - PR/SM dispatches ready tasks of LPARs
    - LPAR weights based shares are enforced by PR/SM only when the processor is at or near 100% busy or LPAR is capped
  - z/OS dispatches tasks within LPAR,
    - z/OS Workload Manager (WLM) Service Policy governs which tasks get highest dispatching priority based on a workload's importance
  - CICS dispatches tasks within each CICS region
    - CICS' Dispatcher handles tasks in their specified priority order while being possibly constrained by various performance and capacity control parameters

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CEC Level Processor Analysis

- LPAR weight and the guaranteed CPU share

LPAR	Weight	% Share	**Guaranteed # of CPs**
PRODHOT1	225	45%	**7.2**
PRODHOT2	225	45%	**7.2**
PRODWARM	50	10%	**1.6**
Totals	**500**	**100%**	**16**

- Effective Dispatch Time from PR/SM view
- Partition Dispatch Time from z/OS view
- **Short CPUs** = task only gets a **fraction** of one CP

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RMF Partition Data Report

P A R T I T I O N D A T A R E P O R T

PAGE

z/OS V1R10 SYSTEM ID S59 DATE 07/28/2009 INTERVAL 15.00.010
RPT VERSION V1R10 RMF TIME 17.00.00 CYCLE 1.000 SECONDS

MVS PARTITION NAME	S59	NUMBER OF PHYSICAL PROCESSORS	26	GROUP NAME	N/A
IMAGE CAPACITY	1127	CP	20	LIMIT	N/A
NUMBER OF CONFIGURED PARTITIONS	12	AAP	2		
WAIT COMPLETION	NO	IFL	0		
DISPATCH INTERVAL	DYNAMIC	ICF	2		
		IIP	2		

--------- PARTITION DATA ----------			-- LOGICAL PARTITION PROCESSOR DATA --						-- AVERAGE PROCESSOR UTILIZATION PERCENTAGES -				
			----MSU----		-CAPPING--		PROCESSOR-		----DISPATCH TIME DATA----		LOGICAL PROCESSORS		--- PHYSICAL PROCESSORS --		
NAME	S	WGT	DEF	ACT	DEF	WLM%	NUM	TYPE	EFFECTIVE	TOTAL	EFFECTIVE	TOTAL	LPAR MGMT	EFFECTIVE	TOTA
S59	A	801	0	502	NO	0.0	20.0	CP	02.13.34.022	02.13.34.604	44.52	44.53	0.00	44.52	44.53
S50	A	500	0	0	NO	0.0	20.0	CP	00.00.00.000	00.00.00.000	0.00	0.00	0.00	0.00	0.00
S51	A	100	0	53	NO	0.0	3.0	CP	00.13.58.918	00.14.00.016	31.07	31.11	0.01	4.66	4.67
S55	A	101	0	68	NO	0.0	20.0	CP	00.18.01.114	00.18.01.538	6.01	6.01	0.00	6.01	6.01
S58	A	999	0	493	NO	0.0	20.0	CP	02.11.06.315	02.11.06.763	43.70	43.70	0.00	43.70	43.70
PHYSICAL										00.00.04.264			0.02		0.02
									-----------	-----------			------	------	------
TOTAL									04.56.40.370	04.56.47.186			0.04	98.89	98.93
S59	A	150					2	AAP	00.00.00.373	00.00.00.419	0.02	0.02	0.00	0.02	0.02
S50	A	150					2	AAP	00.00.00.000	00.00.00.000	0.00	0.00	0.00	0.00	0.00
S51	A	150					2	AAP	00.00.00.737	00.00.00.770	0.04	0.04	0.00	0.04	0.04
S55	A	150					2	AAP	00.00.00.283	00.00.00.327	0.02	0.02	0.00	0.02	0.02
S58	A	150					2	AAP	00.00.00.317	00.00.00.359	0.02	0.02	0.00	0.02	0.02
PHYSICAL										00.00.00.993			0.06		0.06
									-----------	-----------			------	------	------
TOTAL									00.00.01.713	00.00.02.870			0.06	0.10	0.16

Source: RMF V1R10 Report Analysis

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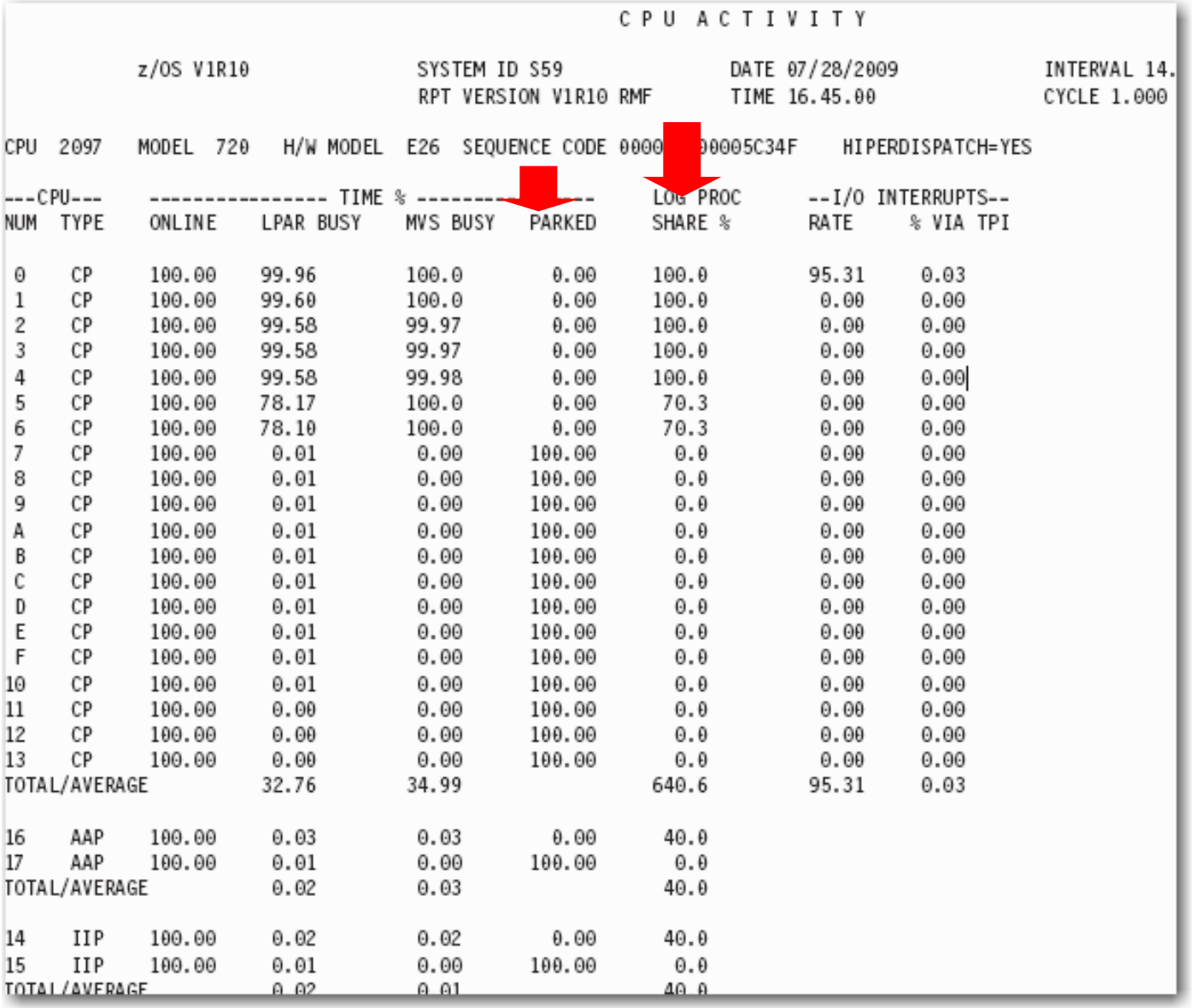
RMF CPU Activity Report



C P U A C T I V I T Y

z/OS V1R10 SYSTEM ID S59 DATE 07/28/2009 INTERVAL 14.
RPT VERSION V1R10 RMF TIME 16.45.00 CYCLE 1.000

CPU 2097 MODEL 720 H/W MODEL E26 SEQUENCE CODE 0000[illegible]00005C34F HIPERDISPATCH=YES

---CPU---		TIME %				LOG PROC	--I/O INTERRUPTS--	
NUM	TYPE	ONLINE	LPAR BUSY	MVS BUSY	PARKED	SHARE %	RATE	% VIA TPI
0	CP	100.00	99.96	100.0	0.00	100.0	95.31	0.03
1	CP	100.00	99.60	100.0	0.00	100.0	0.00	0.00
2	CP	100.00	99.58	99.97	0.00	100.0	0.00	0.00
3	CP	100.00	99.58	99.97	0.00	100.0	0.00	0.00
4	CP	100.00	99.58	99.98	0.00	100.0	0.00	0.00
5	CP	100.00	78.17	100.0	0.00	70.3	0.00	0.00
6	CP	100.00	78.10	100.0	0.00	70.3	0.00	0.00
7	CP	100.00	0.01	0.00	100.00	0.0	0.00	0.00
8	CP	100.00	0.01	0.00	100.00	0.0	0.00	0.00
9	CP	100.00	0.01	0.00	100.00	0.0	0.00	0.00
A	CP	100.00	0.01	0.00	100.00	0.0	0.00	0.00
B	CP	100.00	0.01	0.00	100.00	0.0	0.00	0.00
C	CP	100.00	0.01	0.00	100.00	0.0	0.00	0.00
D	CP	100.00	0.01	0.00	100.00	0.0	0.00	0.00
E	CP	100.00	0.01	0.00	100.00	0.0	0.00	0.00
F	CP	100.00	0.01	0.00	100.00	0.0	0.00	0.00
10	CP	100.00	0.01	0.00	100.00	0.0	0.00	0.00
11	CP	100.00	0.00	0.00	100.00	0.0	0.00	0.00
12	CP	100.00	0.00	0.00	100.00	0.0	0.00	0.00
13	CP	100.00	0.00	0.00	100.00	0.0	0.00	0.00
TOTAL/AVERAGE			32.76	34.99		640.6	95.31	0.03
16	AAP	100.00	0.03	0.03	0.00	40.0		
17	AAP	100.00	0.01	0.00	100.00	0.0		
TOTAL/AVERAGE			0.02	0.03		40.0		
14	IIP	100.00	0.02	0.02	0.00	40.0		
15	IIP	100.00	0.01	0.00	100.00	0.0		
TOTAL/AVERAGE			0.02	0.01		40.0		

Source: RMF V1R10 Report Analysis

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RMF Monitor III Processor Delays - 1

```
                          RMF V1R8 Processor Delays                Line 1 of 138
Command ===>                                                     Scroll ===> HALF

Samples: 60      System: MVS1  Date: 10/31/06  Time: 09.10.00  Range: 60 Sec
```

Jobname	CX	Service Class	CPU Type	DLY %	USG %	EAppl %	Holding Job(s) % Name	% Name	% Name
WSWS7	O	OMVS	CP	11	46	59.4	9 *ENCLAVE	7 DBS3DIST	7 WSP1S2F
WSP1S2FS	SO	WASCR	CP	4	4	42.5	2 DBS3DIST	2 WSWS7	2 VTAM44
			AAP	6	0	98.4	6 *ENCLAVE		
WSP1S6FS	SO	WASCR	CP	0	0	5.3			
			AAP	6	0	7.7	6 *ENCLAVE		
DBS3DBM1	S	DB2HIGH	CP	2	6	0.8	2 XCFAS	2 DBS3DIST	2 WSP1S2F
WSP1S6F	SO	WASCR	CP	0	2	1.9			
			AAP	2	2	0.7	2 *ENCLAVE		
U078069	O	OMVS	CP	2	4	1.2	2 WSWS7	2 DBS3DIST	2 U078069
WSP1S4F	SO	WASCR	CP	0	0	0.1			
			AAP	2	0	0.4	2 WSP1S6F		
U078068	O	OMVS	CP	2	0	0.2	2 XCFAS	2 WSWS7	2 *ENCLAVE
DBS3DIST	SO	DB2HIGH	CP	0	78	111.0			
			IIP	0	2	21.3			
XCFAS	S	SYSTEM	CP	0	28	24.1			

Dispatcher Statistics – Time by TCB Mode

DISPATCHER STATISTICS (Note: Columns 2 – 5 deleted to improve legibility)

TCB Mode	MVS Waits	Total Time in MVS wait	Total Time Dispatched	Total CPU Time / TCB
QR	13051397	000-18:18:33.24	000-01:49:46.74	000-01:12:02.27
RO	48658	000-20:05:12.28	000-00:02:46.27	000-00:01:00.80
CO	0	000-00:00:00.00	000-00:00:00.00	000-00:00:00.00
SZ	0	000-00:00:00.00	000-00:00:00.00	000-00:00:00.00
RP	0	000-00:00:00.00	000-00:00:00.00	000-00:00:00.00
FO	800	000-19:00:52.61	000-00:00:44.05	000-00:00:06.50
SL	1	000-00:00:00.00	000-00:00:00.00	000-00:00:00.00
SO	2	000-00:00:00.00	000-00:00:00.00	000-00:00:00.00
S8	0	000-00:00:00.00	000-00:00:00.00	000-00:00:00.00
D2	2419	000-20:18:01.28	000-00:00:03.26	000-00:00:00.43
L8	16952578	007-03:07:31.31	000-05:36:18.48	000-01:13:35.37
H8	0	000-00:00:00.00	000-00:00:00.00	000-00:00:00.00
J8	0	000-00:00:00.00	000-00:00:00.00	000-00:00:00.00

Recommendation: If QR TCB "Total Time Dispatched" is more than 1.25 times "Total CPU Time/TCB," determine response time degradation and seek increased importance in WLM Service Policy if degradation is significant.

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RMF Workload Activity

```
                                W O R K L O A D   A C T I V I T Y

                                                                                                                PAGE    1
      z/OS V1R10            SYSPLEX SVPLEX3           DATE 07/28/2009          INTERVAL 14.59.995   MODE = GOAL
                            RPT VERSION V1R10 RMF     TIME 12.00.00

                                        POLICY ACTIVATION DATE/TIME 11/01/2007 10.12.11
                                             - WORKLOAD & SERVICE CLASS PERIODS -

------------------------------------------------------------------------------------------------------------------- SERVICE CLASS(ES)

REPORT BY: POLICY=BASEPOL    WORKLOAD=STC_WLD    SERVICE CLASS=STCHIGH    RESOURCE GROUP=*NONE
                                                 CRITICAL     =NONE
                                                 DESCRIPTION  =High priority for STC workloads

-TRANSACTIONS-  TRANS-TIME HHH.MM.SS.TTT  --DASD I/O--  ---SERVICE---   SERVICE TIME  ---APPL %---  --PROMOTED--  ----STORAGE----
AVG       0.00  ACTUAL                62  SSCHRT   0.0  IOC          0   CPU    0.000  CP      0.00  BLK    0.000  AVG       695.77
MPL       0.00  EXECUTION             62  RESP     0.0  CPU          0   SRB    0.015  AAPCP   0.00  ENQ    0.000  TOTAL       1.49
ENDED       62  QUEUED                 0  CONN     0.0  MSO          0   RCT    0.009  IIPCP   0.00  CRM    0.000  SHARED      0.00
END/S     0.03  R/S AFFIN              0  DISC     0.0  SRB       2933   IIT    0.000
#SWAPS      62  INELIGIBLE             0  Q+PEND   0.0  TOT       2933   HST    0.000  AAP     0.00               -PAGE-IN RATES-
EXCTD        0  CONVERSION             0  IOSQ     0.0  /SEC         2   AAP    0.000  IIP     0.00               SINGLE      0.0
AVG ENC   0.00  STD DEV              482                                  IIP    0.000                             BLOCK       0.0
REM ENC   0.00                                          ABSRPTN   759                                            SHARED      0.0
MS ENC    0.00                                          TRX SERV  757                                            HSP         0.0

PER IMPORTANCE  PERF      --TRANSACTIONS--      -------------RESPONSE TIME--------------    -EX VEL%-   TOTAL   -EXE--
                INDX      -NUMBER-     -%-      ------GOAL------  ---ACTUAL---     TOTAL   GOAL  ACT   USING%  DELAY%
1   1            0.5           62     100      00.00.00.500  80%    98.4%          98.4%         0.0     0.0     0.0
2   2            N/A            0       0      00.00.05.000  80%     0.0%                         N/A     0.0     0.0
3   3            N/A            0       0      00.00.15.000 AVG  00.00.00.000                    N/A     0.0     0.0

TOTAL                          62     100

REPORT BY: POLICY=BASEPOL    WORKLOAD=STC_WLD    SERVICE CLASS=STCLOW     RESOURCE GROUP=*NONE
                                                 CRITICAL     =NONE
                                                 DESCRIPTION  =Low priority for STC workloads

-TRANSACTIONS-  TRANS-TIME HHH.MM.SS.TTT  --DASD I/O--  ---SERVICE---   SERVICE TIME  ---APPL %---  --PROMOTED--  ----STORAGE----
AVG       0.12  ACTUAL             5.341  SSCHRT   0.1  IOC     250903   CPU   14.636  CP      0.82  BLK    0.000  AVG       679.09
MPL       0.12  EXECUTION          5.341  RESP     2.7  CPU       2946K  SRB    0.032  AAPCP   0.00  ENQ    0.000  TOTAL      81.44
```

Source: RMF V1R10 Report Analysis

Any questions? Email to: ivan@gelbis.com; Call: 732-303-1333

RMF Workload Activity - 2

```
REPORT BY: POLICY=BASEPOL    WORKLOAD=CICS_WLD   SERVICE CLASS=CICSLOW    RESOURCE GROUP=*NONE      PERIOD=1 IMPORTANCE=4
                                                 CRITICAL     =NONE

-TRANSACTIONS-  TRANS-TIME HHH.MM.SS.TTT
AVG       0.00  ACTUAL                 0
MPL       0.00  EXECUTION              0
ENDED      893  QUEUED                 0
END/S     0.50  R/S AFFIN              0
#SWAPS       0  INELIGIBLE             0
EXCTD        0  CONVERSION             0
AVG ENC   0.00  STD DEV                0
REM ENC   0.00
MS ENC    0.00

           RESP  ------------------------------ STATE SAMPLES BREAKDOWN (%) ------------------------------  ------STATE------
SUB    P   TIME  --ACTIVE-- READY IDLE  ----------------------------WAITING FOR----------------------------  SWITCHED SAMPL(%)
TYPE        (%)   SUB  APPL             MISC TIME                                                          LOCAL SYSPL REMOT
CICS  BTE   0.0   0.0   0.0   0.0  6.7  88.9  4.4                                                            0.0   0.0   0.0
CICS  EXE   0.0   0.0   0.0   0.0  0.0   0.0  0.0                                                            0.0   0.0   0.0

GOAL: RESPONSE TIME 000.00.30.000 FOR  75%

        RESPONSE TIME EX    PERF
SYSTEM     ACTUAL%    VEL% INDX

*ALL           100      N/A  0.5
CB8B           100      N/A  0.5
CB86           100      N/A  0.5
CB87           100      N/A  0.5
CB88           100      N/A  0.5
CB89           100      N/A  0.5

                                    ----------RESPONSE TIME DISTRIBUTION----------
   ----TIME----     --NUMBER OF TRANSACTIONS--     -------PERCENT-------  0    10   20   30   40   50   60   70   80   90   100
   HH.MM.SS.TTT     CUM TOTAL        IN BUCKET    CUM TOTAL   IN BUCKET  |....|....|....|....|....|....|....|....|....|....|
<  00.00.15.000          893              893          100         100  >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>
<= 00.00.18.000          893                0          100         0.0  >
<= 00.00.21.000          893                0          100         0.0  >
```

Save CPU time and money! Get the Goal and Response time Distribution from RMF. No CICS transaction level data collection required to get this!

Source: RMF V1R10 Report Analysis

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RMF Workload Activity - 3

```
REPORT BY: POLICY=HPTSPOL1   WORKLOAD=PRODWKLD   SERVICE CLASS=CICSHR    RESOURCE GROUP=*NONE    PERIOD=1
IMPORTANCE=HIGH


-TRANSACTIONS--  TRANSACTION TIME    HHH.MM.SS.TTT
AVG         0.00  ACTUAL              000.00.00.114
MPL         0.00  QUEUED              000.00.00.036
ENDED        216  EXECUTION           000.00.00.078
END/SEC     0.24  STANDARD DEVIATION 000.00.00.270
#SWAPS         0
EXECUTD      216
```

Response time

```
          -------------------------------RESPONSE TIME BREAKDOWN IN PERCENTAGE--------------------   ------STATE------
SUB    P  TOTAL ACTIVE READY  IDLE  -------------------------WAITING FOR--------------------------   SWITCHED TIME (%)
TYPE                                LOCK   I/O  CONV  DIST  LOCAL  SYSPL  REMOT  TIMER  PROD  MISC   LOCAL SYSPL REMOT
CICS   BTE  93.4  10.2   0.0   0.0   0.0   0.0  83.3  0.0   0.0    0.0    0.0    0.0    0.0   0.0    83.3  0.0   0.0
CICS   EXE  67.0  13.2   7.1   0.0   0.0   0.0   0.0  0.0   0.0    0.0    0.0    0.0    46.7  0.0     0.0  0.0   0.0
```

Time in DB2 or IMS or MQ

This is a sample RMF post processor (ERBRMFPP) output with option SYSRPTS(WLMGL(SCPER))

Source: Chris Baker, IBM Hursley, UK

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I/O Device Activity (RMF PP Report)

D I R E C T A C C E S S D E V I C E A C T I V I T Y

PAGE 6

z/OS V1R8 SYSTEM ID SYS1 DATE 11/28/2006 INTERVAL 14.59.946
RPT VERSION V1R8 RMF TIME 16.30.00 CYCLE 1.000 SECONDS

TOTAL SAMPLES = 900 IODF = A3 CR-DATE: 07/21/2006 CR-TIME: 07.42.20 ACT: POR

STORAGE GROUP	DEV NUM	DEVICE TYPE	VOLUME SERIAL	PAV	LCU	DEVICE ACTIVITY RATE	AVG RESP TIME	AVG IOSQ TIME	AVG CMR DLY	AVG DB DLY	AVG PEND TIME	AVG DISC TIME	AVG CONN TIME	% DEV CONN	% DEV UTIL	% DEV RESV	AVG NUMBER ALLOC	% ANY ALLOC	% MT PEND
	0401	3380K	SYSLIB		0032	1.246	4.6	0.0	0.0	2.2	2.5	0.1	2.0	0.25	0.26	0.0	89.6	100.0	0.0
	0402	3380K	SYSUSR		0032	0.250	1.4	0.0	0.0	0.1	0.3	0.0	1.0	0.03	0.03	0.1	14.0	100.0	0.0
	040F	3380K	SCL338		0032	0.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
			LCU		0032	1.496	4.1	0.0	0.0	1.8	2.1	0.1	1.8	0.07	0.07	0.0	104	100.0	0.0
	044F	3380K	MVSPG1		0033	0.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	0460	3380K	RMFLIB		0033	0.036	6.1	0.0	0.0	0.3	1.5	0.0	4.6	0.02	0.02	0.0	0.0	100.0	0.0
	047F	3380K	MVSPLX		0033	0.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
			LCU		0033	0.036	6.1	0.0	0.0	0.3	1.5	0.0	4.6	0.00	0.00	0.0	4.0	100.0	0.0
	0500	33903	MVSLIB		0034	0.082	22.6	0.0	0.0	13.0	16.2	0.3	6.1	0.05	0.05	0.0	20.4	100.0	0.0
	0501	33903	MVSSCF		0034	0.012	1.6	0.0	0.0	0.0	0.5	0.0	1.0	0.00	0.00	0.0	4.6	100.0	0.0
	0502	33903	MVSCI2		0034	0.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
OMVSSYS	0503	33903	MVSOP2		0034	0.008	19.2	0.0	0.0	0.0	0.8	0.0	18.4	0.01	0.01	0.0	0.0	100.0	0.0
	0705	33909	15CY09		0035	0.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0
	0707	33909	16RJ02		0035	0.036	55.2	0.0	0.0	36.7	44.6	0.0	10.6	0.04	0.04	0.0	0.0	100.0	0.0
	0708	33909	15CYX9		0035	0.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.0	0.0	100.0	0.0

Any questions? Email to: ivan@gelbis.com; Call: 732-303-1333

RMF Monitor III- Device Delays

```
                          RMF V1R8  Device Delays                  Line 1 of 57
Command ===>                                                    Scroll ===> HALF

Samples: 100     System: MVS1   Date: 10/31/06  Time: 10.03.20  Range: 100   Sec

           Service  DLY  USG  CON  ------------ Main Delay Volume(s) ------------
Jobname  C Class     %    %    %    %  VOLSER   %  VOLSER   %  VOLSER   %  VOLSER

MARYPATM B NRPRIME   70   51   54   70 TSOL11    1 DUMP00
MICHAELL B NRPRIME   39   15   14   39 BPXLK1
MCPDUMP  S SYSSTC    36   18   20   36 D24PK2
CHARLESR B NRPRIME   33   13   13   28 BPXLK1    3 HSML02    2 BPXSSK
DFHSM    S SYSSTC    30   83   35   10 HSML17    5 SMS026    4 HSMOCD    4 HSMBCD
SHUMA3   T TSOPRIME  18   52   53   13 D83ID0    5 HSML02
DAVEP    T TSOPRIME  16    9   10    4 HSM009    3 HSM005    2 HSML06    1 SMS013
CATALOG  S SYSTEM     9   15   21    2 CLR007    1 HSM036    1 HSM018    1 HSM011
DB2MDBM1 S SYSSTC     9    7    5    7 DB2MS2    1 DB2MD0    1 DB2MS0
GINNI    T TSOPRIME   8   10    9    3 HSML17    2 CLR010    1 HSM032    1 NATPK1
TREVORJ  T TSOPRIME   6   10   11    2 HSM022    1 HSM001    1 RESPK1    1 HSM024
RHANSON  T TSOPRIME   6    9    8    4 HSML17    1 RESPK1    1 NATPK1
KOCH     T TSOPRIME   6    3    3    2 HSML17    1 CLR010    1 HSM018    1 HSM043
```


Any questions? Email to: ivan@gelbis.com; Call: 732-303-1333

M3- File I/O Tuning – VSAM RLS

```
                    RMF V1R8 VSAM RLS Activity   - SYSPLEX          Line 1 of 20
Command ===>                                                    Scroll == => HALF

Samples: 120      Systems: 2    Date: 10/31/06  Time: 13.25.00  Range: 120  Sec

                 < 2GB / > 2GB
LRU Status    :   Good / Accel
Contention % :     0.0 /   0.0
False Cont % :     0.0 /   0.0
```

VSAM RLS activity by data set.

Also available by Storage Class.

Sphere/DS	Access	Resp Time	Read Rate	Read BMF%	Read CF%	Read DASD%	BMF Valid%	BMF False Inv%	Write Rate
BMAI.VSAMIN.MEGA									
BMAI.VSAMIN.MEGA.AIX.DATA									
Below 2GB	DIR	0.003	0.01	0.0	0.0	100	0.0	0.00	0.00
	SEQ	0.000	0.00	0.0	0.0	0.0	0.0	0.00	0.00
Above 2GB	DIR	0.003	0.01	0.0	0.0	100	0.0	0.00	0.00
	SEQ	0.000	0.00	0.0	0.0	0.0	0.0	0.00	0.00
BMAI.VSAMIN.MEGA.AIX.INDEX									
Below 2GB	DIR	0.003	0.03	50.0	0.0	50.0	100	0.00	0.00
	SEQ	0.000	0.00	0.0	0.0	0.0	0.0	0.00	0.00
Above 2GB	DIR	0.003	0.03	50.0	0.0	50.0	100	0.00	0.00
	SEQ	0.000	0.00	0.0	0.0	0.0	0.0	0.00	0.00
BMAI.VSAMIN.MEGA.DATA									
Below 2GB	DIR	0.000	7.45	83.2	0.0	16.8	100	0.00	0.00
	SEQ	0.000	0.00	0.0	0.0	0.0	0.0	0.00	0.00

Any questions? Email to: ivan@gelbis.com; Call: 732-303-1333

CICS VSAM File Control Statistics

File Name	Get Requests	Get Upd Requests	Browse Requests	Update Requests	Add Requests	Delete Requests	Brws Upd Requests	VSAM EXCP Requests Data	VSAM EXCP Requests Index	RLS req Timeouts	
AAAB2SP	34238	0	0	0	0	0	0	22	1	0	
BBBACTV	0	27	0	27	376636	0	0	382501	0	0	
CCCFNDD	65928	0	0	0	0	0	0	15089	6228	0	
DDDIAFD	4767	0	25159	0	0	0	0	12609	148	0	
EEEINTX	27088	0	8124	0	0	0	0	3	2	0	☺
FFFPNDD	17969	5310	0	5310	166	0	0	9905	799	0	
GGGSCRX	488	0	0	0	0	0	0	18	59	0	
HHHSEGH	33043	43	1712	43	43	0	0	1597	841	0	☺
IIISEG1	48931	6925	531	2810	6739	4115	0	15537	2862	0	
JJJSEG2	23634	745	0	205	745	540	0	1291	1	0	
KKKTBLS	537	0	75997	0	0	0	0	525	26	0	☺
LLLTEST	0	0	0	0	41741	0	0	43761	0	0	
MMMULHD	54891	43	0	43	0	0	0	806	453	0	☺
NNNUNLD	32679	1640	0	1586	53	0	0	7319	2670	0	
OOOPCFIL	37752	0	0	0	0	0	0	21	1	0	☺
TOTALS	427489	18626	155690	13864	459660	4655	0	536868	15546	0	

Notes & Recommendations:

1. Totals are greater than all files shown because many files deleted from sample.
2. Focus your tuning to minimize/eliminate VSAM EXCP Requests.
3. ☺ shown next to files with superior performance (least EXCP-s/Request).
4. BBB tuning options: faster IO service, application changes, file attributes,…
5. CCC, DDD, III, NNN appear to be good candidates for data in memory tuning.

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CICS LSR Pools Statistics

LSRPOOLS

Total number of pools built	17
Peak requests that waited for string	2
Total requests that waited for string	125
Peak concurrently active strings	6

Shared Buffers

Pool Number	Look-asides	Reads	User writes	Non-user writes
1	644389	48039	4596	0
2	53249	824	0	0
3	234800	2568	139	0
4	83125	5164	5620	0
5	187335	21327	1658	0
6	23980	10	24460	0
7	397988	7033	12882	0
8	86917	1443	1507	0
TOTALS	1711783	86408	50862	0

Recommendations: (1) Minimize/eliminate waits for strings. (2) Add buffers until reads are being reduced significantly. (3) Use multiple LSR pools to separate data from index, and good from poor buffer candidates.

Any questions? Email to: ivan@gelbis.com; Call: 732-303-1333

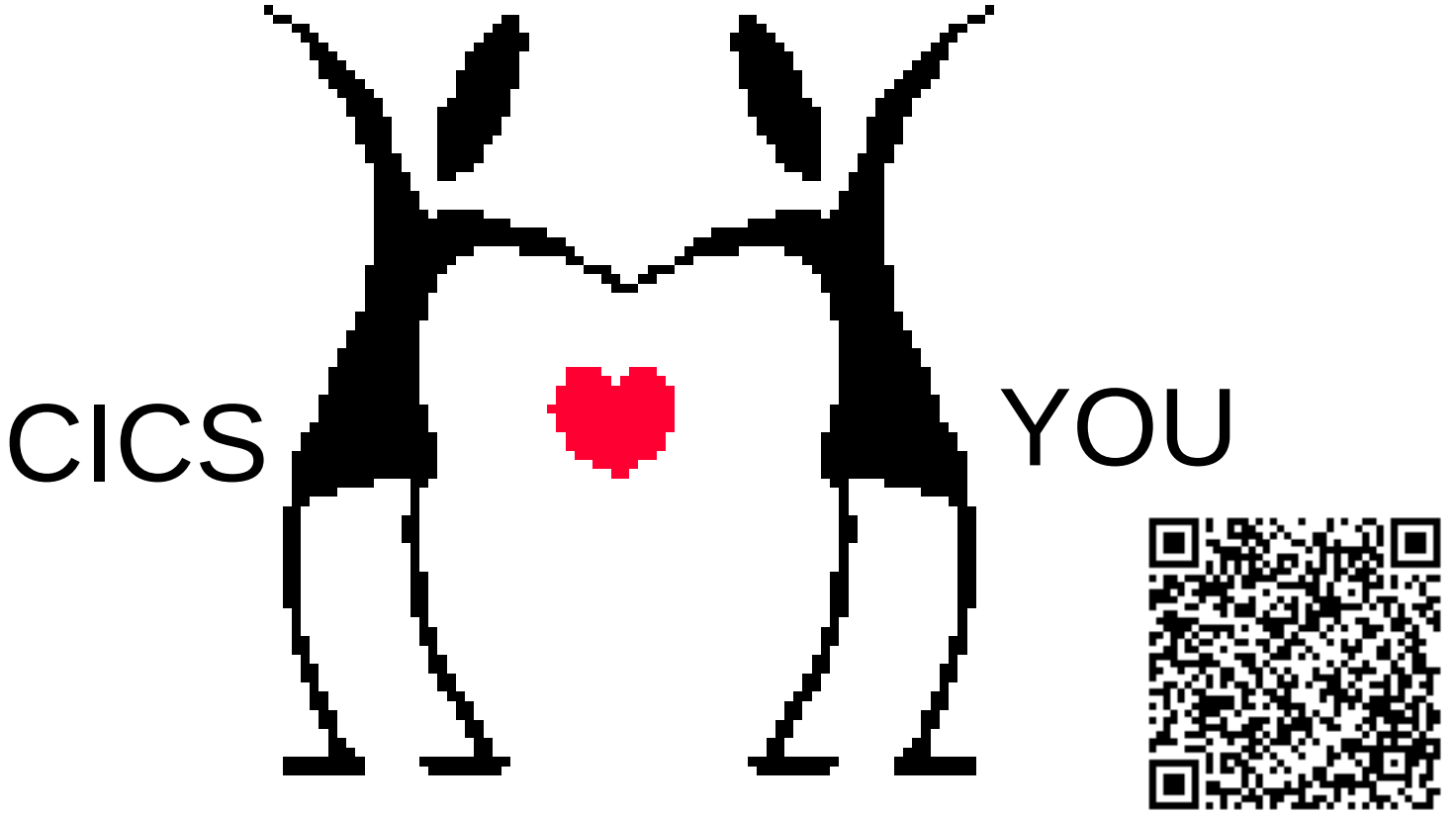
What Else To Do?

- Continuously test ability to predict outcome of "What If" scenarios – keep an up to date list of such questions.
- Temporary Storage (TS) I/O reduction
- Transient Data (TD) I/O reduction
- DBMS access and activity tuning
- Look for "Unusual" applications activity which frequently causes unpredictability

Any questions? Email to: ivan@gelbis.com; Call: 732-303-1333

Be @Next SHARE / Questions?

Next SHARE in San Antonio, TX, 02/28 – 03/04/2016



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