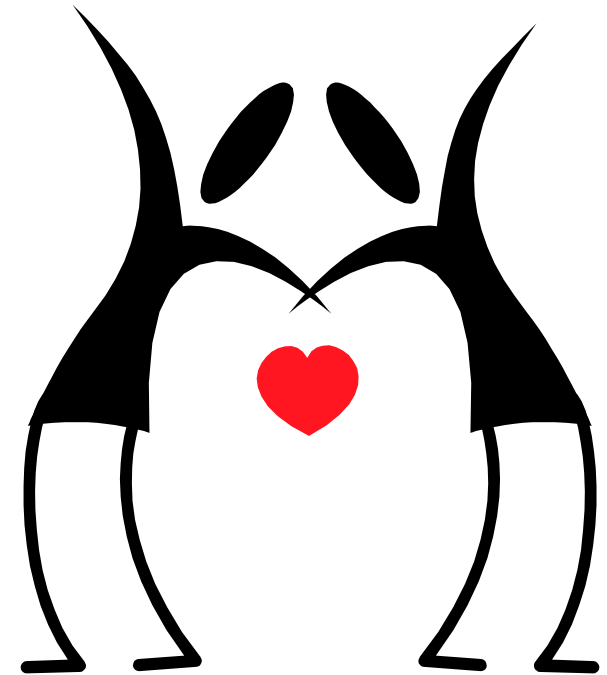


June 13, 2002

# CICS Performance Management 2002

By Ivan Gelb



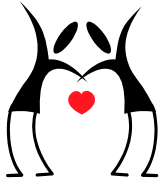


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Gelb Information Systems Corp.

10 Country Club Lane

Marlboro, NJ 07746

Phone: 732-303-1333

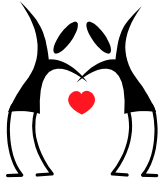
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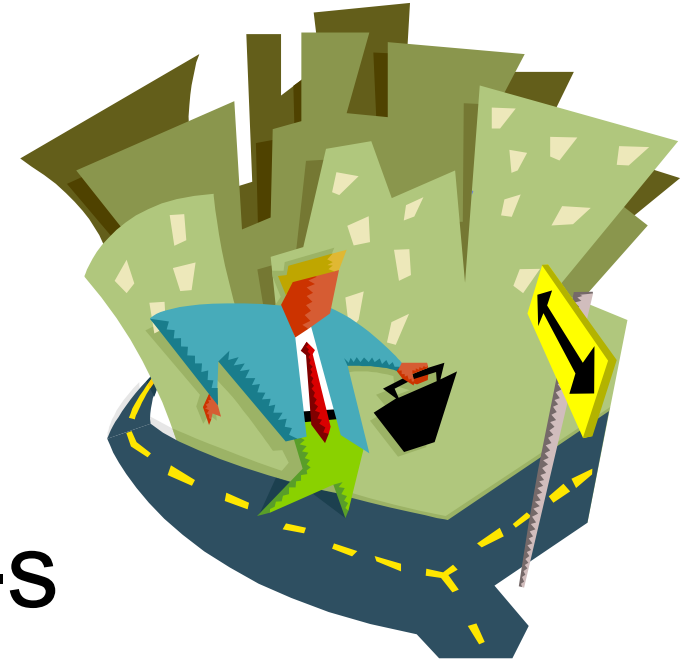
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# Contents

- CICS Overview
- CICS & WLM Release 10+
- Definitions Do-s and Don't-s
- Best Practices
- Performance Reports
- CICS, DB2, and WLM coexistence



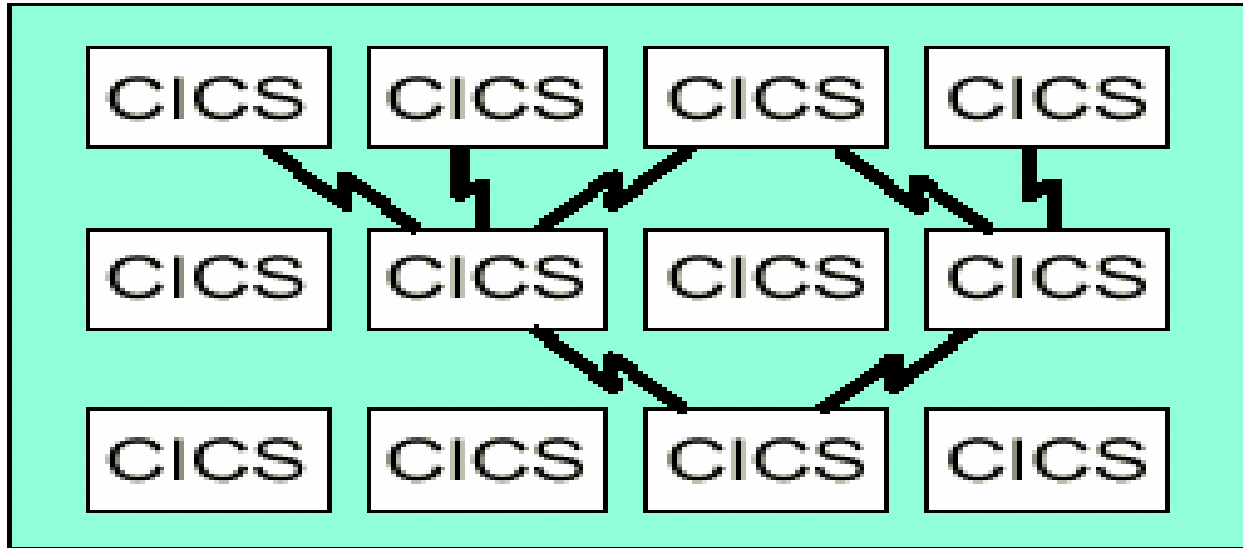


# CICS Overview

## CPU A

DB2

DB2

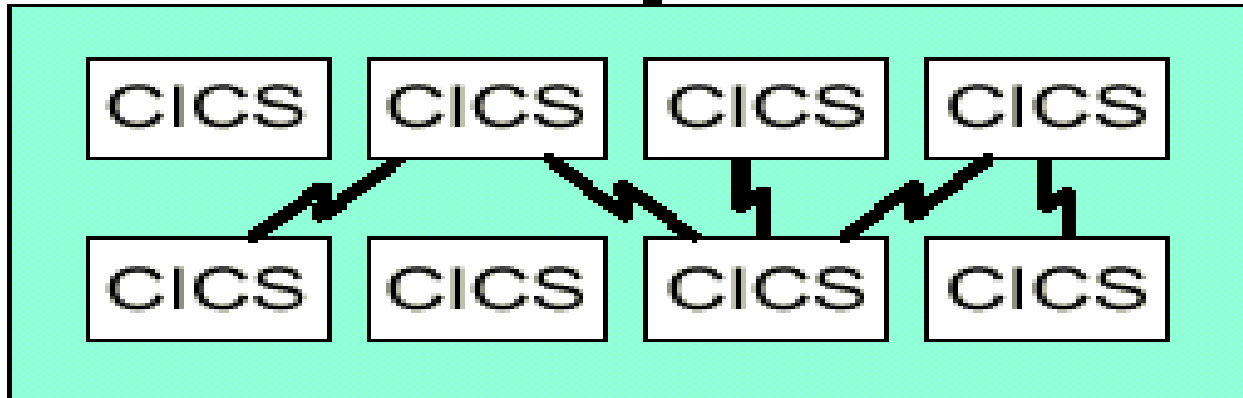


MVS

## CPU B

DB2

VSAM

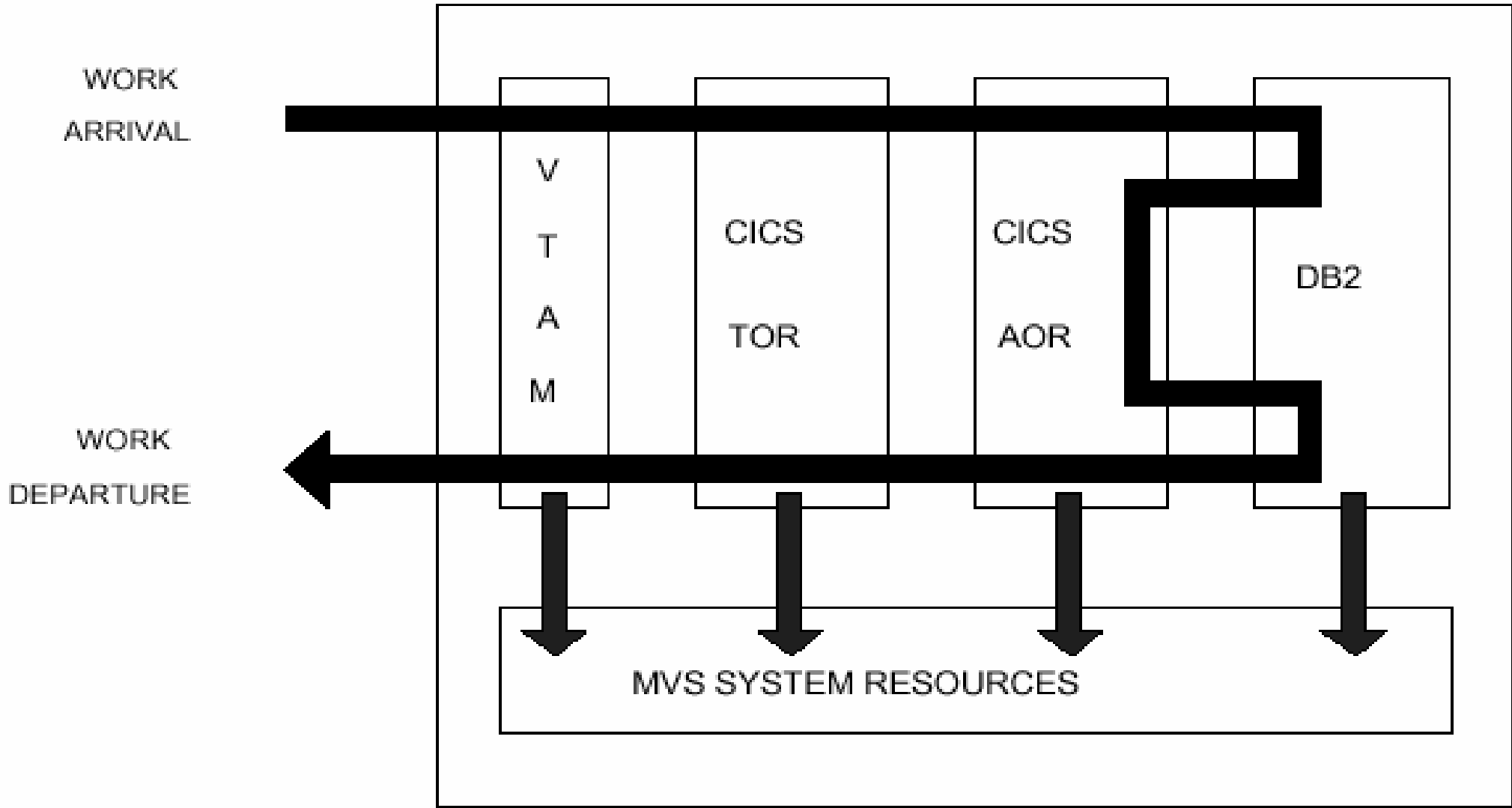


MVS

Source: Dave Raiman, IBM



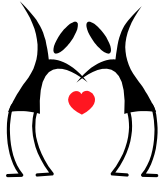
# CICS Work Path



Source: WSC Performance Team presentation, IBM

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Slide 7



# CICS and Workload Manager (WLM) Release 10+



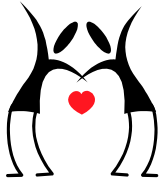
# CICS & WLM

- Work types terminology:
  - Loved – must get done with specified quality of service; degradation of service is addressed with tuning or purchase of added resources
  - Wanted – should get done; only severe degradation in service might be addressed with tuning or purchase of added resources
  - Un-loved – would like to get it done if resources available; degradation almost never addressed with tuning or purchase of added resources



# CICS & WLM

- OS/390 (now zOS) Workload Manager:
  - Designed to deliver performance based on service level goals
  - May do service policy adjustments every 10 sec.
  - Resource adjustments every 2 seconds
  - If transaction management, Performance Blocks (PB) states sampled at 250 millisecond intervals
  - If region management: PBs are sampled every 10 intervals (10 \* 250 ms)
  - One PB for each unit of MXT in every CICS!
- Recommendation: Keep MXT as low as possible without turning it into a bottleneck unless you intend to cause PAIN!



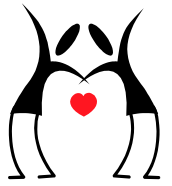
# WLM Dictionary

- Service definition = IPS and ICS
  - Create/maintain with ISPF panels
- Policies
  - Alternative service objectives usually based on time-of-day or day-of-week, etc.
- Service class = Performance groups
- Report class = Reporting performance group
- Resource group = A new function for software and other physical or logical resource control



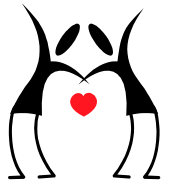
# WLM Managed Resources

- Processor (CPU)
- Storage controls
- Multi-programming levels (MPL)
- I/O priority
- Parallel I/O access volumes
- JES initiators
- DB2 stored procedure address spaces
- Websphere scalable address spaces



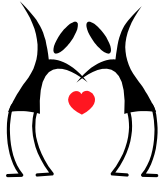
# CICS Issues if WLM < Rel 10

- NO guarantee that CPU access of your loved CICS work will be protected from all lower priority work
- DITTO for central storage – can cause CICS “pain” due to paging
- CICS Conversational transactions not manageable with response time goals



# WLM Service Class Goal Types

- Pre-defined service classes
  - SYSTEM (fixed CPU DP=255)
  - SYSSTC (fixed CPU DP=254)
- Percentile response time
- Average response time
- Velocity – to guarantee access only...
- Discretionary – when you just DON'T NEED TO CARE!



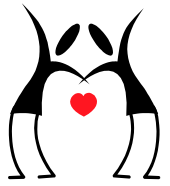
# WLM R10 Options

- Identify work as CPU Critical
- Identify work as Storage Critical
- CICS regions can be managed based on:
  - Transaction response time goals **or**
  - Region level response time goals **or**
  - Region level velocity goals



# WLM CPU Critical Protection

- Problem before WLM R10
  - WLM's slow reaction to sudden increases in CICS CPU demand
- New option CPU Critical = YES
  - Defined for single period service classes with velocity or response time goals
  - CICS region's CPU dispatching priority will be kept higher than all less important work even if all of CICS' goals are being met



# WLM Storage Critical Protection

- Problem before WLM R10
  - CICS with fluctuating activity levels exposed to page stealing that results in demand paging related delays
- New option Storage Critical = YES
  - CICS region's working set is kept very close to its high water mark (HWM)



# Definitions Do-s and Don't-s

- NEXT > Considerations for:
  - SYSSTC
  - Percentile Response Time
  - Average Response Time
  - Velocity Goals
  - Non-conversational Transactions
  - Conversational Transactions
  - Test Regions



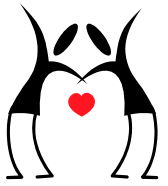
# SYSSTC

- THE place for “trusted servers” and
- Usual candidates
  - VTAM,
  - JES
  - IRLM
  - IMSCTL
- Consider for “pure” CICS TORs



# Percentile Response Time

- The recommended way to manage loved CICS production work
- Stated as:
  - 90% of transactions with < 1 sec. Resp.
- Can address problems caused by long running or never ending transactions



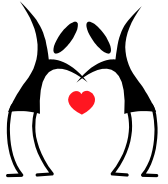
# Average Response Time

- Can ONLY work acceptably for homogeneous CICS workloads
- Stated as:
  - ALL transactions < 1 sec. AVG. Resp.
- “Fooled” by long running transactions ending in the interval
- Once “fooled” it will over-protect CICS



# Velocity Goals -1

- “Execution velocity is an abstract mathematical description with no objectively measurable metric.”  
--John Arwe, WLM Developer
- Velocity calculated from sampled states:  
$$\text{CPU\_Using\_Time} / (\text{CPU\_Using\_Time} + \text{WLM\_Managed\_Delays})$$
  - WLM Managed delays: CPU, paging, swapping, MPL, IOs



# Velocity Goals -2

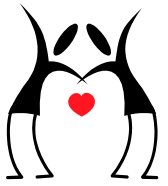
- DO NOT use for any loved CICS work
- Velocity goals NEVER work as tools for relative priority
- Velocity goals do not determine CPU dispatching priority
- CICS TOR velocities fluctuate severely
- CICS TORs can be hurt by WLM's efforts to manage them



# Velocity Goals –3

- Turns your LOVED CICS into BRAIN DONOR to lower importance work!
- When velocity goal is reached, your LOVED CICS will be 1<sup>st</sup> on the donors list of WLM –this almost always HURTS!





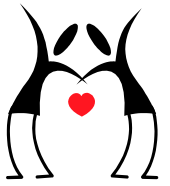
# Velocity Goals – When?

- Recommended for non-transactional work or work that “needs” a limiter
- Low importance + low velocity can control known “loopers”
- Consider use of resource group maximum with velocity goals to impose an absolute limit
- CICS test regions



# Non-conversational Transactions

- For Non-conversational Transactions high in priority
  - Define all service classes with:
    - CPU Critical = YES
    - Storage Critical = YES (only if hurt by paging)
  - Manage all involved regions as servers as long as there are enough ended transactions for WLM to effectively work



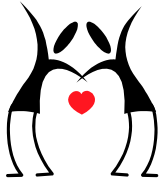
# Conversational Transactions

- Conversational Transactions high in priority
  - Goal = REGION
    - CPU Critical = YES
    - Storage Critical = YES (only if hurt by paging)



# CICS Test Regions

- The problems: (1) due to low transaction rate and highly varied transaction mix, will be difficult to manage with response time goals, and (2) a propensity to loop!
- Solution: Manage with velocity goals combined with resource group maximum as needed

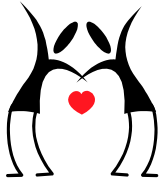


# Best Practices



# Best Practices - 1

- **PRTYAGE=nnnnn Don't do it!**
  - If you made a transaction low priority, does it become more important if it lingers longer? We think NOT!
  - Higher priority reached by ageing good for just a one time dispatch, then transaction reverts to original priority



# Best Practices - 2

- MRO Long running mirrors

MROLRM = YES

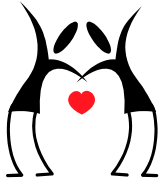
- Good idea – can save CPU with no downside risk!

- MRO Batching

MROBTCH = nn

- Could save CPU

- Will increase response time



# Best Practices - 3

- TRACE = NO
  - Saves 20 – 35% CPU / transaction!
- MN = ON
  - CPU cost of 2 – 3% is all it takes to produce CMF records



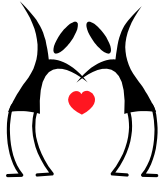
# Best Practices - 4

- TRANISO = NO  
STGPROT = NO
  - Transaction isolation and storage protection are NOT FREE!
  - Can cause SOS in DSA
  - Increases CPU / transaction



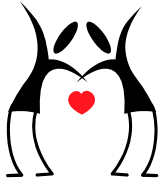
# Best Practices - 5

- CICS TS Ver. 1.1+ Log Manager
  - Replaced journal control – has 3 “flavors”
    1. Nonvolatile Coupling Facility (CF) – uses CF and MVS data space for backup – highest performer!
    2. Volatile CF – uses CF and disk file
    3. Disk file only – uses disk file for log and a data space – lowest performer



# Best Practices - 6

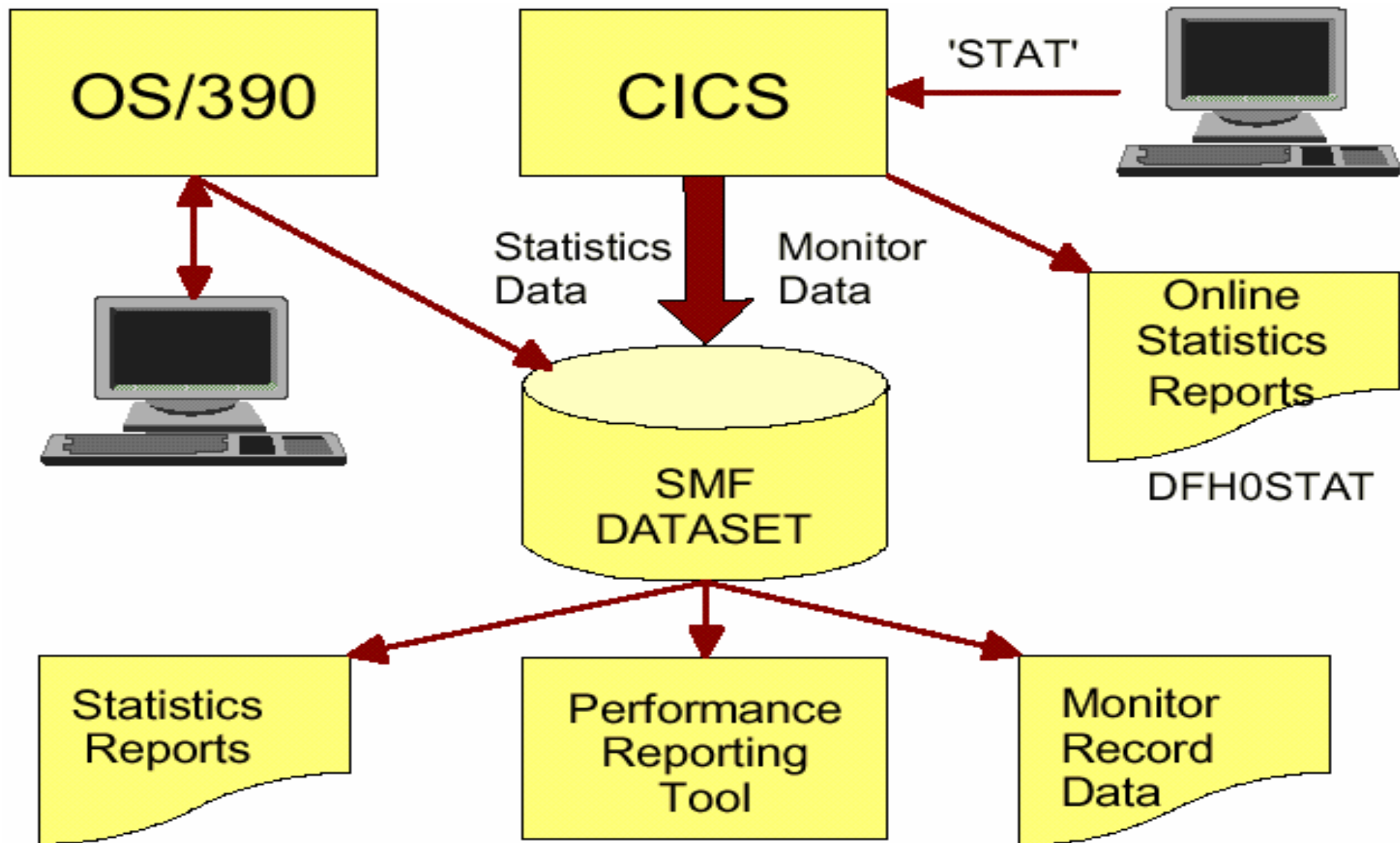
- CICS TS Ver. 1.1+ Log Manager
  - LGDFINT considerations
    - Low value may:
      - Reduce response time
      - Increase CPU consumption
    - High value
      - Increase response time
      - Reduce CPU consumption



# Performance Monitoring



# Monitoring Overview



Source: Chris Baker, IBM



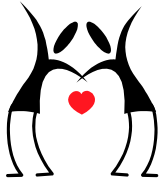
# Measurement Data Sources

- Resource Measurement Facility (RMF)
  - System wide resource level details: CPU disks, storage, work details and summary
- System Management Facility (SMF)
  - Address space level details for work: batch, STC, CICS, etc. + resource level details/address space
- CICS daily and interval statistics
  - Region level statistics and resource counters for: CPU, IO, storage, etc...
- CICS Monitoring Facility (CMF)
  - Transaction level excruciating details by region



# Performance Reporting

- Consider RMF for reporting CICS response time BUT—
- If goal = REGION, response times not reported to service class(es)
- At least TORs must be managed with goal = TRANSACTION
- You should not, but you can manage a mix of goal = REGION with goal = TRANSACTION

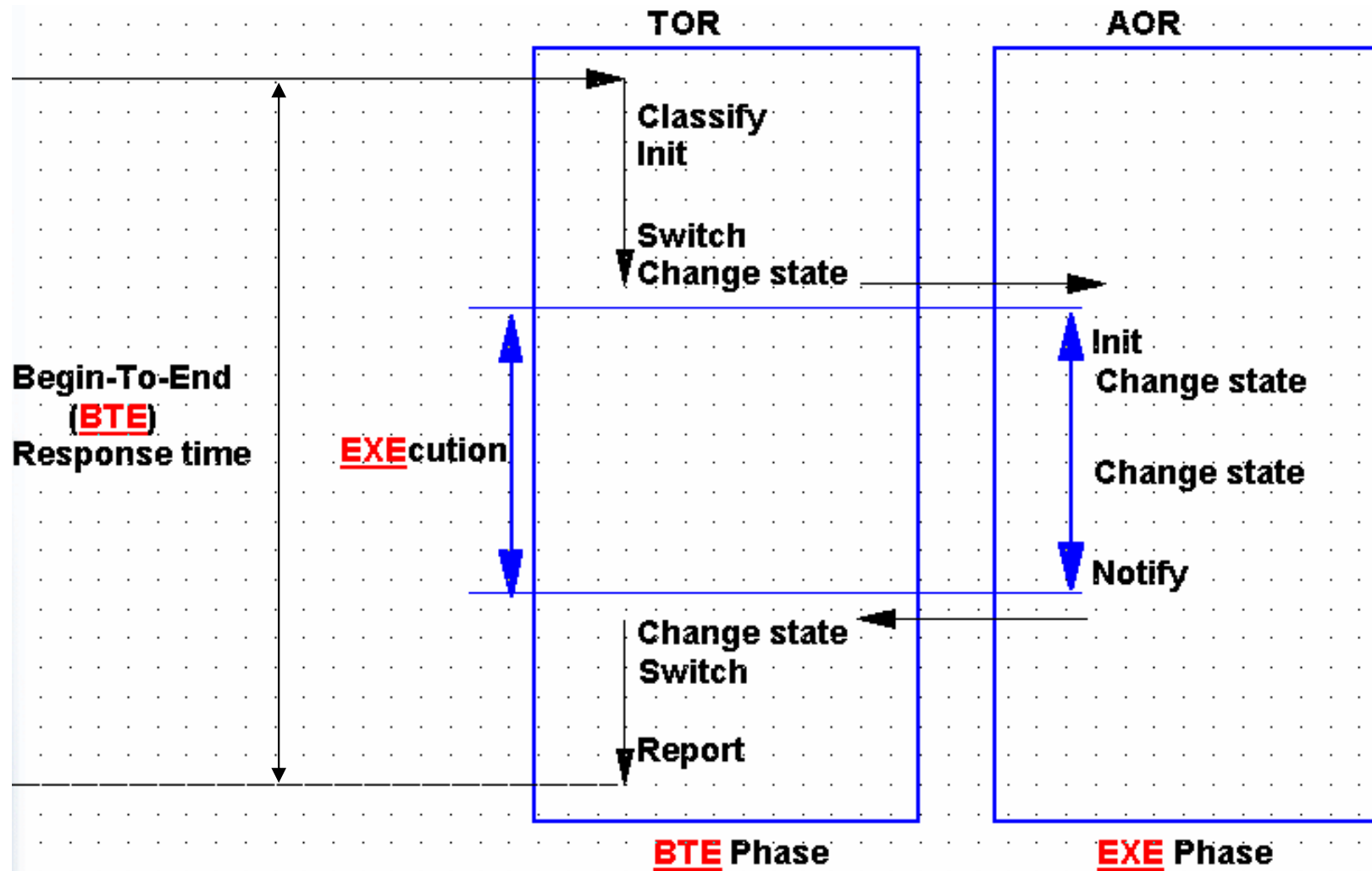


# RMF Reports

- Effective reporting for least cost in computer resources highly depends on CICS work classification
- 2 – 6% CPU/CICS region can be saved if CMF based response time reporting is replaced with RMF only reports



# RMF's CICS Measurements

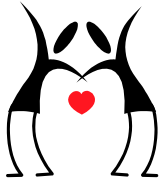


Source: Chris Baker, IBM

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Slide 41





# RMF Workload Activity - 2

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

```

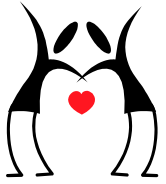
```

-----RESPONSE TIME BREAKDOWN IN PERCENTAGE-----
-
SUB P TOTAL ACTIVE READY IDLE -----WAITING FOR----- SWITCHED TIME
(%)
TYPE
REMOT LOCK I/O CONV DIST LOCAL SYSPL REMOT TIMER PROD MISC LOCAL SYSPL
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

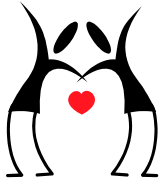
```

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

Source: Chris Baker, IBM

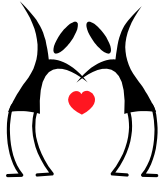


# CICS Statistics Highlights



# CICS Statistics -1

- Written to SMF
- Control:  
CEMT SET STATISTICS  
INTERVAL(hhmmss)  
ENDOFDAY(hhmmss)
- Can be requested via CEMT for any one of the over 20 specific areas of CICS



# CICS Statistics –2

- Requested statistics produced by:  
CEMT PERFORM STATISTICS RECORD  
ALL or over 20 specific domains
- Requested RESET statistics produced by:  
CEMT PERFORM STATISTICS RECORD  
ALL RESETNOW or specific domains
- Unsolicited statistics are produced for dynamically managed resources: buffer pools, terminals, files...



# CICS Statistics

- Dispatcher Domain
- Storage Manager Domain
- File Control
- LSR Buffer Pools



# Dispatcher Domain -1

1. Current MXT limit
  2. Nr. Of Times MXT reached
  3. Peak tasks??
  4. Current AMXT limit (obsolete 4.1+)
  5. Current AMXT count (obsolete 4.1+)
  6. CMXT/TRANCLASS limit by class
  7. CMXT/TRANCLASS limit reached by class
- NOTE: Limits should only be hit intentionally, but watch out for MXT as cause of WLM CPU!



# Dispatcher Domain –2

- Timings by TCB
  - CO = Concurrent
  - FO = File Owning
  - RO = Resource Owning
  - RP = ONC/RPC
  - SL = Sockets Listener
  - SO = Sockets
  - SZ = FEPI
  - J8 = JVM
  - L8 = Open
  - S8 = Secure Sockets Layer



# Dispatcher Domain -3

1. Number of MVS waits /TCB
  2. Accum time in MVS wait /TCB
  3. Accum. Time dispatched /TCB
  4. Accum. CPU time /TCB
- Track & Note
    - Total CPU consumption rate of region
    - Wait-for-dispatch = 3 – 4 (w/o capture ratio)

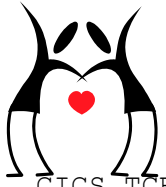


# Dispatcher Statistics – 1

## DISPATCHER STATISTICS

---

```
Dispatcher Start Date and Time. . . : 04/06/2001 14:29:30.0385
Address Space CPU Time. . . . . : 00:10:50.5035
Address Space SRB Time. . . . . : 00:00:01.1067
Current number of tasks . . . . . :          20
Peak number of tasks. . . . . :          25
Current ICV time (msec) . . . . . :       10000
Current ICVR time (msec). . . . . :        5000
Current ICVTSD time (msec). . . . . :        100
Current PRTYAGE time (msec) . . . :           0
Current Max Open TCB limit (MAXOPENTCBS). :           5
Current Open TCBs . . . . . :           0
Peak Open TCBs. . . . . :           0
Current Open TCBs in use. . . . . :           0
Peak Open TCBs in use . . . . . :           0
Times at Max Open TCB Limit . . . . . :           0
Total TCB Attaches delayed by MAXOPENTCBS :           0
Total MAXOPENTCBS delay time. . . . . : 00:00:00.000
Current Attaches delayed by MAXOPENTCBS . :           0
Current MAXOPENTCBS delay time. . . . . : 00:00:00.000
```



CICS TCB Statistics

# Dispatcher Statistics – 2

Mode	Current TCBs	Peak TCBs	TCBs Attached	Detached Unclean	Detached Stolen	Detached Other	TCB Steals
QR	1	1	0	0	0	0	0
RO	1	1	0	0	0	0	0
CO	0	0	0	0	0	0	0
SZ	0	0	0	0	0	0	0
RP	0	0	0	0	0	0	0
FO	1	1	0	0	0	0	0
SL	0	0	0	0	0	0	0
SO	0	0	0	0	0	0	0
J8	0	0	0	0	0	0	0
L8	0	0	0	0	0	0	0
S8	0	0	0	0	0	0	0

Mode	Current TCBs	MVS Waits	Accum Time in MVS wait	Accum Time Dispatched	Accum CPU Time / TCB
QR	1	1539796	00:11:11.3798	00:03:58.6218	00:03:49.3229
RO	1	13	00:10:20.4162	00:00:00.3332	00:00:00.0171
CO	0	0	00:00:00.0000	00:00:00.0000	00:00:00.0000
SZ	0	0	00:00:00.0000	00:00:00.0000	00:00:00.0000
RP	0	0	00:00:00.0000	00:00:00.0000	00:00:00.0000
FO	1	0	00:00:00.0000	00:00:00.0000	00:00:00.0000
SL	0	0	00:00:00.0000	00:00:00.0000	00:00:00.0000
SO	0	0	00:00:00.0000	00:00:00.0000	00:00:00.0000
J8	0	0	00:00:00.0000	00:00:00.0000	00:00:00.0000
L8	0	0	00:00:00.0000	00:00:00.0000	00:00:00.0000
S8	0	0	00:00:00.0000	00:00:00.0000	00:00:00.0000



# Transaction Class Report

CICS 5.3.0 Statistics Utility Program

Report Date 04/09/2001 Report Time 09:01:02 Page 4

Interval Report 10 (00:15:00) Collection Date-Time 04/06/2001-17:00:00 Last Reset 16:45:00 Applid PR2A1CIC Jobname MYHOTAOR

## TRANSACTION CLASS STATISTICS

Tclass	Number	Max	Purge	T O T A L						Peak	Peak	Times	Times	C U R R E N T		
Name	Trandfs	Act	Thresh	Attaches	AcptImm	PrgImm	Queued	PrgQ'd	Q-Time	Act	Queued	MaxAct	PrgThr	Act	Queued	QueueTime
DFHCOMCL	2	10	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
DFHEDFTC	0	10	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
DFHTCIND	0	10	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
DFHTCL01	99	5	0	13	13	0	0	0	00:00:00	2	0	0	0	0	0	00:00:00
DFHTCL02	0	5	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
DFHTCL03	2065	70	0	73936	73936	0	0	0	00:00:00	10	0	0	0	4	0	00:00:00
DFHTCL04	4	1	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
DFHTCL05	0	1	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
DFHTCL06	0	1	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
DFHTCL07	0	1	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
DFHTCL08	1	5	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
DFHTCL09	0	1	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
DFHTCL10	0	1	0	0	0	0	0	0	00:00:00	0	0	0	0	0	0	00:00:00
*TOTALS*	2171			73949	73949	0	0	0	00:00:00			0	0	4	0	00:00:00

Queue Time should only be caused intentionally and otherwise minimized via tuning activity. If you cause waits in CICS, WLM can never help your loved one.



# Storage Manager

1. DSA & EDSA+others size
  2. DSA & EDSA+others used
  3. DSA & EDSA+others cushion sizes
  4. *D&E=0 Times no storage returned*
  5. *D&E=0 Times requests suspended*
  6. *D&E=0 Times cushion released*
  7. *D&E=0 Times short-on-storage (SOS)*
  8. *Total time SOS*
- *Objectives: Avoid/minimize 4, 5, 6, 7, & 8!!!*



# Storage Utilization

Storage ABOVE 16MB

CICS Trace table size . . . . .	: 2,000K	Current EDSA Limit. . . . .	: 51,200K
EXT minus Current EDSA Limit. . . . .	: 22,528K	Current Allocation for EDSAs . . . . .	: 11,264K
		Peak Allocation for EDSAs . . . . .	: 11,264K

	ECDSA	EUDSA	ESDSA	ERDSA	Totals
Current DSA Size . . . . .	5,120K	1,024K	1,024K	4,096K	11,264K
Current DSA Used . . . . .	4,396K	64K	8K	3,676K	8,144K
Current DSA Used as % of DSA. :	85%	6%	0%	89%	72%
Size					
* Peak DSA Used . . . . .	4,400K	64K	8K	3,676K	
Peak DSA Size . . . . .	5,120K	1,024K	1,024K	4,096K	
Cushion Size . . . . .	128K	0K	128K	256K	
Free Storage (inc. Cushion) . :	724K	960K	1,016K	420K	
* Peak Free Storage . . . . .	768K	1,024K	1,016K	540K	
* Lowest Free Storage . . . . .	720K	960K	1,016K	420K	
Largest Free Area . . . . .	724K	960K	1,016K	304K	
Largest Free Area as % of DSA :	14%	93%	99%	7%	
Largest Free/Free Storage . . :	1.00	1.00	1.00	0.72	
Current number of extents . . :	5	1	1	4	11
Number of extents added . . . :	0	0	0	0	
Number of extents released. . :	0	0	0	0	
Getmain Requests . . . . .	11,499	1,416	0	4	
Freemain Requests . . . . .	7,732	1,410	0	0	
Current number of Subpools. . :	153	3	3	175	
Add Subpool Requests . . . . :	109	109	0	0	
Delete Subpool Requests . . . :	107	107	0	0	0
Times no storage returned . . :	0	0	0	0	0
Times request suspended . . . :	0	0	0	0	0
Current requests suspended. . :	0	0	0	0	0
Peak requests suspended . . . :	0	0	0	0	0
Requests purged while waiting :	0	0	0	0	0
Times Cushion released. . . . :	0	0	0	0	0
Times Short-On-Storage. . . . :	0	0	0	0	0
Total time Short-On-Storage . :	00:00:00.00000	00:00:00.00000	00:00:00.00000	00:00:00.00000	
Average Short-On-Storage time :	00:00:00.00000	00:00:00.00000	00:00:00.00000	00:00:00.00000	
Storage Violations . . . . .	0	0	0	0	0
Access . . . . .	CICS	CICS	CICS	READONLY	

Source: Chris Baker, IBM



# File Control

1. FC Calls total by type
  2. Data component I/Os
  3. Index component I/Os
- Objective:
    - Maximize ratio of:  
 **$\Sigma \text{Calls} / (\text{Data} + \text{Index I/Os})$**



# LSR Buffer Pools

1. Buffer size
  2. Number of buffers
  3. Look-aside hits (This = saved I/Os)
  4. Buffer reads (I/Os required)
  5. User-initiated buffer writes (bad for LSR!)
  6. Number of requests waited for strings
- Objectives: maximize 3 & minimize 4 by adding buffers; isolate 5s; minimize 6s!!!



# Files Statistics - 1

File Name	Dataset Name Base Dataset Name (If Applicable)	Dataset Type	DT Indicator	Time Opened	Time Closed	Remote Name	Remote Sysid	Lsrpool ID
BATCNTL	C23.CEMTBTCH.VSC.BATCNTL	R		03:00:28	OPEN			N
BATSTAT	C23.CEMTBTCH.VSC.BATSTAT	K			CLOSED			1
DFHCSD	C23.CICS410.DFHCSD	K			CLOSED			1
UNAPPMMSG	C23.UIPV.UNAPPMMSG	K		07:42:32	OPEN			1
UNERRMSG	C23.UIPV.UNERRMSG				CLOSED			1
UNMSGC	C23.UIPV.UNMSGC	K		07:42:30	OPEN			1
UNMSGCAL	C23.UIPV.UNMSGCAL				CLOSED			1
UNMSGLOG	C23.UIPV.UNMSGLOG	K		03:00:43	OPEN			1
UNMSGPB	C23.UIPV.UNMSGPB				CLOSED			1
UNMSGPO	C23.UIPV.UNMSGPO	K		03:00:48	OPEN			1
UNSITEB	C23.UIPV.UNSITEB	K		03:00:45	OPEN			1
UNSTATB	C23.UIPV.UNSTATB	K		03:00:47	OPEN			1
UNSYSERR	C23.UIPV.UNSYSERR				CLOSED			1
UNTRANCT	C23.UIPV.UNTRANCT				CLOSED			1
UNUNDMMSG	C23.UIPV.UNUNDMMSG				CLOSED			1
VAOO	C23.NMPV.VAOO	K		07:43:32	OPEN			1
VBOO	C23.NMPV.VBOO	K		07:43:34	OPEN			1
VBOOVV	C23.NMPV.VBOOVV.PATH C23.NMPV.VBOO	P		07:42:33	OPEN			1
VXOO	C23.NMPV.VXOO				CLOSED			1

Source: Chris Baker, IBM



# Files Statistics - 2

File Name	Get Requests	Get Upd Requests	Browse Requests	Update Requests	Add Requests	Delete Requests	VSAM Data	EXCP	Requests Index
BATCNTL	963	1	0	1	0	0		965	0
BATSTAT	0	0	0	0	0	0		0	0
DFHCSD	0	0	0	0	0	0		0	0
UNAPPMSG	0	0	0	0	0	0		0	0
UNERRMSG	0	0	0	0	0	0		0	0
UNMSGC	0	0	0	0	0	0		0	0
UNMSGCAL	0	0	0	0	0	0		0	0
UNMSGLOG	0	0	0	0	0	0		0	0
UNMSGPB	0	0	0	0	0	0		0	0
UNMSGPO	0	0	0	0	0	0		0	0
UNSITEB	0	0	0	0	0	0		0	0
UNSTATB	0	0	0	0	0	0		0	0
UNYSERR	0	0	0	0	0	0		0	0
UNTRANCT	0	0	0	0	0	0		0	0
UNUNDMSG	0	0	0	0	0	0		0	0
V400	0	0	0	0	0	0		0	0
V800	0	0	0	0	0	0		0	0
V800VV	0	0	0	0	0	0		0	0
VX00	0	0	0	0	0	0		0	0
*TOTALS*	963	1	0	1	0	0			

Source: Chris Baker, IBM



# Files Statistics - 3

FILES - Performance Information

File Name	Strings	Active Strings	<-----Wait On Strings-----> Current	Total	Highest	<---Buffers---> Data	Index
BATCNTL	1	0	0	0	0	2	1
BATSTAT	1	0	0	0	0	2	1
DFHCSD	2	0	0	0	0	0	0
UNAPPMMSG	2	0	0	0	0	3	3
UNERRMSG	2	0	0	0	0	3	3
UNMSGC	5	0	0	0	0	6	5
UNMSGCAL	2	0	0	0	0	3	3
UNMSGLOG	2	0	0	0	0	3	3
UNMSGPB	2	0	0	0	0	3	3
UNMSGPO	2	0	0	0	0	3	3
UNSITEB	2	0	0	0	0	3	3
UNSTATB	2	0	0	0	0	3	3
UNSYSERR	2	0	0	0	0	3	3
UNTRANCT	2	0	0	0	0	3	3
UNUNDMSG	2	0	0	0	0	3	3
VAOO	2	0	0	0	0	3	3
VBOO	2	0	0	0	0	3	2
VBOOVV	2	0	0	0	0	3	3
VXOO	2	0	0	0	0	3	3
*TOTALS*	39	0	0	0	0		

Source: Chris Baker, IBM



# Files Statistics - 4

---

```

Pool Number :          1
  Time Created                : 03:00:41.7304
  Maximum key length         :                98
  Total number of strings    :                23
  Peak requests that waited for string :                0
  Total requests that waited for string :                0
  Peak concurrently active strings :                0
  
```

## Shared Buffers

---

Size	Number	Look- asides	Reads	User writes	Non-user writes	
512	8	109	2	0	0	
1024	8	158368	238	123	0	
4096	38	673235	49827	56804	0	
8192	9	183415	42	49507	0	
20480	3	0	0	0	0	
<b>*TOTALS*</b>		66	1015127	50109	106434	0

Source: Chris Baker, IBM

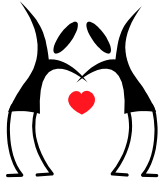


LSRPOOL FILES

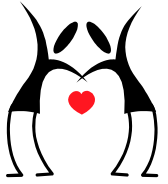
# Files Statistics - 5

Pool Number	File Name	Data Size	Buff Size	Index	Buff Size	Total	Buff Waits	Peak	Buff Waits
1	BATSTAT		4096		512		0		0
1	DFHCSD	20480			512		0		0
1	UNAPPMSG	8192			4096		0		0
1	UNERRMSG	0			0		0		0
1	UNMSGC	4096			4096		0		0
1	UNMSGCAL	0			0		0		0
1	UNMSGLOG	8192			8192		0		0
1	UNMSGPB	0			0		0		0
1	UNMSGPO	512			8192		0		0
1	UNSITEB	1024			4096		0		0
1	UNSTATB	1024			4096		0		0
1	UNYSERR	0			0		0		0
1	UNTRANCT	0			0		0		0
1	UNUNDMSG	0			0		0		0
1	VAOO	4096			4096		0		0
1	VBOO	4096			4096		0		0
1	VBOOVV	4096			4096		0		0
1	VXOO	0			0		0		0
*TOTALS*							0		0

Source: Chris Baker, IBM



# CICS DB2 Coexistence



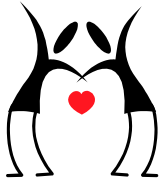
# CICS DB2 Considerations

- CICS RCT defined threads = umbilical cords to DB2 processing
- Each thread uses an MVS TCB
- Over specifying wastes CPU and storage
- CICS and DB2 relative priority is important and sometimes counterintuitive
- Optimize for low/0 thread waits



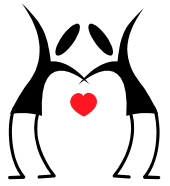
# RCT DPMODE Options

- **DPMODE=HIGH**
  - Best for high volumes with little DB2 use as long as ample CPU capacity is available
- **DPMODE=EQUAL**
  - **May(!)** provide better performance for non-SQL transactions
- **DPMODE=LOW**
  - Can provide more consistent service in some CPU constrained situations – otherwise AVOID!
- **Important Note:** All 3 will work OK if non-CPU constrained in a multi-CP complex!



# References

- <http://www.s390.ibm.com/products/wlm/>
- OS/390 MVS Planning: Workload Management, GC28-1761
- z/OS V1R1.0 MVS Planning: Workload Management, SA22-7602
- OS/390 Workload Manager Implementation and Exploitation, SG24-5326
- CICS Performance Management Guide, SC33-1699



# Session End / Affair Beginning

CICS



WLM