Session: E51

CICS TS Performance Tips/Tuning

John Lawson

September 19 - 23, 2005 San Francisco, CA

RETURN TO INDEX

CICS TS Performance Tips/Tuning

Presented by:
John Lawson

illustro Systems
1950 Stemmons Frwy. Suite 5001
Dallas, Texas 75207
Phone: 214-800-8900
http://www.illustro.com

illustro™ SYSTEMS INTERNATIONAL, LLC
See The Light.™

Trademarks

The following are trademarks of International Business Machines Corporation

IBM
CICS/VSE
PL/I VSE
ESA/390
z/VM
z/VSE
CICS
COBOL/VSE
VSE/ESA
VTAM
S/390

All other trademarks are trademarks of their respective companies.

Topics

- Definition of performance and tuning
- CICS performance constraints
- Options to reduce constraints
- Monitoring CICS performance
- Summary

Definitions

Performance

The overall quality of service and operations of a given system as determined by ease-of-use, availability, response time, and throughput

Performance Evaluation

The analysis of such factors as throughput rate, turnaround time, and constrained resources to determine how well a system is meeting specific processing requirements

Definitions…

Constraint

A place in the system where contention for a resource is affecting performance, sometimes referred to as "transaction throughput degradation" or bottleneck.

Tuning

The process of adjusting system control variables to make the system divide its resources most efficiently for the workload

CICS Performance Constraints

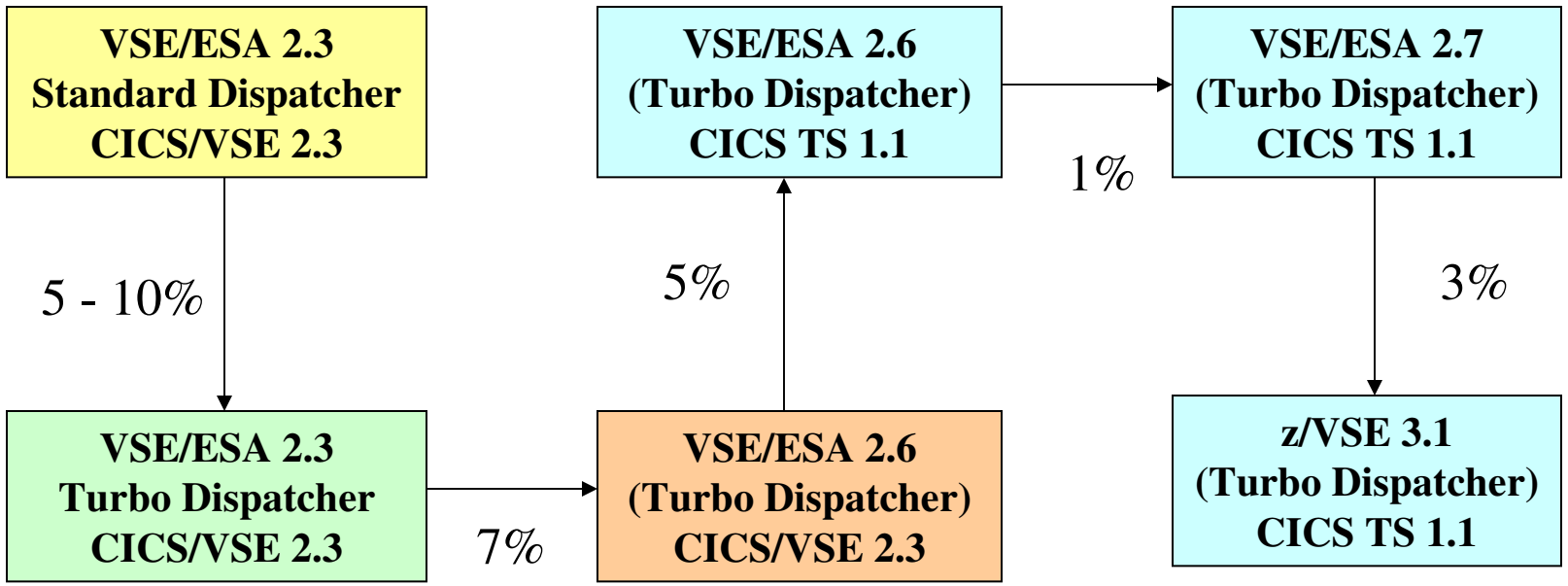
- Hardware
  - CPU cycles
  - Real storage
  - I/O
    - DASD
    - Network
- Software
  - Software specifications
  - Virtual storage

Hardware - CPU Cycles

- VSE/ESA 2.4+ supports Turbo Dispatcher only
  - Uses more CPU time than standard dispatcher
- CICS TS uses more CPU time than CICS/VSE
- Review current CPU usage before migrating
  - IUI system status
  - Vendor monitoring products

Hardware - CPU Cycles…

- CPU Time Requirements
  Source: VSE Performance Considerations documents



Hardware - CPU Cycles…

- Solutions to processor constraint problems
  - Limit number of concurrent tasks in CICS
    - Lower MXT value
    - Use transaction classes

```
CEDA DEFINE TRANCLASS(CLASS01) MAXACTIVE(5)
CEDA DEFINE TRANSACTION … TRANCLASS(CLASS01)
```

  - Replaces DFHSIT CMXT and PCT TCLASS parameters in CICS/VSE 2.3

Hardware - CPU Cycles…

- Solutions to processor constraint problems
  - Reduce trace overhead
    - Turn off system tracing
    - Use CICS TS special tracing by transaction or terminal
  - Increase CICS TS partition priority
  - Implement Shared Data Tables

Hardware - CPU Cycles…

Activating CICS TS Special Tracing

```
CETR                    CICS Trace Control Facility              CIC1 DBDCCICS

Type in your choices.

Item                                Choice       Possible choices

Internal Trace Status          ===>  STARTED      STArted, STOpped
Internal Trace Table Size      ===>  256     K    16K - 1048576K

Auxiliary Trace Status         ===>  STOPPED      STArted, STOpped, Paused
Auxiliary Trace Dataset        ===>  A            A, B
Auxiliary Switch Status        ===>  NO           NO, NExt, All



Master System Trace Flag       ===>  ON           ON, OFf        <-- Set to OFF
Master User Trace Flag         ===>  ON           ON, OFf            Set to OFF

When finished, press ENTER.



PF1=Help      3=Quit      4=Components      5=Ter/Trn      9=Error List
```

Hardware - CPU Cycles…

Activating CICS TS Special Tracing

```
CETR                    Transaction and Terminal Trace          CIC1 DBDCCICS

Type in your choices.

Item                                  Choice       Possible choices

Transaction ID                ===>    ABCD         Any valid 4 character ID
Transaction Status            ===>    SPECIAL      STandard, SPecial, SUppressed

Terminal ID                   ===>    NB05         Any valid Terminal ID
Netname                       ===>    TELNB05      Any valid Netname
Terminal Status               ===>    SPECIAL      STandard, SPecial

Terminal ZCP Trace            ===>    OFF          ON, OFf

When finished, press ENTER.

PF1=Help      3=Quit                                9=Error List
```

Hardware – Real Memory

- May require more real memory
- Virtual storage requirements are larger
  - CICS TS 31-bit partition GETVIS
    - Minimum 12.5MB plus VSAM buffer requirements
    - 50MB in VSE/ESA environment B ALLOC proc
  - More data space usage
    - Basic Security Manager
    - CICS Data Management Facility (DMF)
    - CICS Shared Data Tables
    - Environment B SYSDEF DSIZE=20MB

Hardware – Real Memory…

- Exploiting more 31-bit virtual will increase real storage requirements
- Ideal paging rate for CICS system is zero
  - Review paging rates before migrating
    - SIR command or IUI system status dialog
    - Vendor monitoring product
- Solutions to paging problems
  - Buy more real memory
  - Reduce CICS virtual storage usage

Hardware – Real Memory…

IUI System Activity Display

```
 IESADMDA              DISPLAY SYSTEM ACTIVITY              15 Seconds  19:57:05
*---- SYSTEM (CPUs:  1 /  0 ) ----* *------------ CICS : DBDCCICS ------------*
|CPU       :   0%   I/O/Sec:    1  | |No. Tasks:     136   Per Second :     *  |
|Pages In  :    0   Per Sec:    *  | |Dispatchable:    0   Suspended  :     3  |
|Pages Out:     0   Per Sec:    *  | |Peak Active :    6   MXT reached:     0  |
*---------------------------------* *----------------------------------------*
Priority: Z,Y,W,X,S,R,P,C,BG=FA=F9=F8=F7=F6=F5=F4,T,F2,M,F3,FB,F1

 ID S JOB NAME  PHASE NAME  ELAPSED     CPU TIME   OVERHEAD   %CPU       I/O
 F1 1 POWSTART    IPWPOWER  221:05:14       8.25       4.47              4,607
 FB B SECSERV     BSTPSTS   221:05:14        .25        .13                337
 F3 3 VTAMSTRT    ISTINCVT  221:05:10      44.30      23.76              4,097
 F2 2 CICSICCF    DFHSIP    221:05:03     337.74     180.87             21,949
 F4 4 <=WAITING FOR WORK=>                 .00        .00                  2
 F5 5 <=WAITING FOR WORK=>                 .00        .00                  2
 F6 6 <=WAITING FOR WORK=>                 .00        .00                  2
 F7 7 <=WAITING FOR WORK=>                 .00        .00                  2
 F8 8 <=WAITING FOR WORK=>                 .00        .00                  2
 F9 9 <=WAITING FOR WORK=>                 .00        .00                  2
 FA A <=WAITING FOR WORK=>                 .00        .00                  2
 BG 0 <=WAITING FOR WORK=>                 .00        .00                  2

PF1=HELP      2=PART.BAL.   3=END        4=RETURN     5=DYN.PART   6=CPU
```

Hardware – Real Memory…

- Load CICS TS phases in SVA
  - DFHSIT SVA=YES (default is NO)
  - Not an option if running CICS/VSE 2.3 partition
- Reduce VSAM buffer requirements
  - Use LSR pools or fewer buffers
- Limit number of concurrent tasks in CICS
  - Lower MXT value

Hardware – DASD I/O

- Reduce number of I/O requests
  - User VSAM files and CICS system files
  - Tune VSAM IDCAMS definitions
  - Use LSR pools
    - Index buffers are now separate from data buffers
  - Increase VSAM index and data buffers
    - More index buffers for random processing
    - More data buffers for sequential processing
  - Use Shared Data Tables

Hardware – DASD I/O…

- Reduce number of I/O requests
  - Minimize program compression and loading
    - Make application programs 31-bit enabled
    - Use virtual disk for program load library
- Reduce I/O service times
  - Multiple control units
  - Multiple channel paths
  - DASD caching
  - Faster DASD

Software - specifications

- Waits caused by task parameters
  - MXT
    - Limits total number of user tasks in CICS partition
    - CICS TS pre-allocates storage based on MXT
    - Don’t use 999
  - Transaction class
    - Limits total number of user tasks by class name
    - IBM supplied definitions DFHTCL01 – DFHTCL10 for transaction classes 1-10
    - MAXACTIVE default is 1

Software - specifications…

- Waits caused by task parameters
  - Transaction processing priority
    - Three-digit value less than or equal 255
    - Transaction priority + terminal priority + operator priority
  - Priority aging
    - Mechanism to keep low priority tasks from being stranded
    - SIT PRTYAGE=32768|nnnnn (milliseconds)
    - Transaction priority increase by 1 every nnnnn ms.

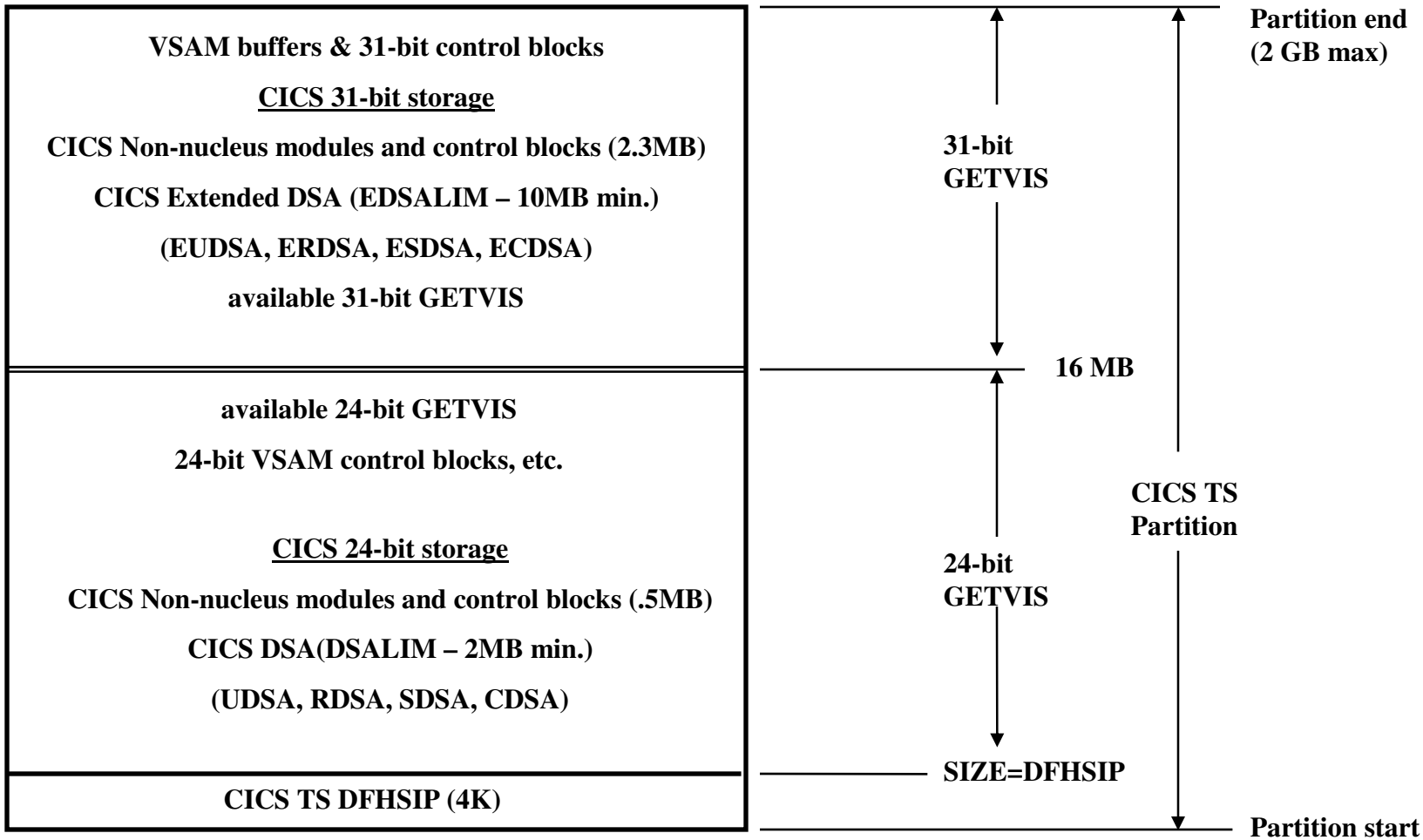
Software - specifications...

- Waits caused by CICS VSAM definitions
  - Avoid wait on VSAM strings and buffers
    - STRNO, BUFNI and BUFND parameters
    - User VSAM files in FCT
    - LSR buffer pools
    - Transient data and temporary storage datasets
  - Avoid NOSPACE condition
    - Transient data and temporary storage datasets
    - Define secondary allocation or monitor space usage

Software – virtual storage

- CICS TS Partition
  - Most of CICS nucleus above 16 MB line
  - All major CICS control blocks above 16 MB line
  - 8 Dynamic Storage Areas (DSA)
    - 4 DSAs above 16 MB line in extended (31-bit) DSA (EDSA)
    - 4 DSAs below 16 MB line in 24-bit DSA

Software – virtual storage…



CICS Transaction Server Partition

Software – virtual storage...

- Parameters that control CICS TS Dynamic Storage Areas
  - SIT EDSALIM
    - Maximum amount of GETVIS for CICS 31-bit DSAs
    - Minimum size 10MB, default 20MB
  - SIT DSALIM
    - Maximum amount of GETVIS for CICS 24-bit DSAs
    - Minimum size 2MB, default 5MB
  - Monitor with CEMT INQ DSA or statistics

Software – virtual storage...

- Parameters to exploit 31-bit storage
  - Transaction definition
  - Program definition
  - EXEC CICS GETMAIN requests
  - Program's addressing mode (AMODE) and residency mode (RMODE)
  - SIT options

Software – virtual storage...

- Transaction definition parameters
  - Controls DSA used for task lifetime storage
    - TASKDATALOC(value)
      - BELOW 24-bit DSA
      - ANY either 31-bit or 24-bit DSA
        - Program must be linked AMODE(31)

Software – virtual storage...

- Program definition parameters
  - Controls DSA used for EXEC commands with SET option
    - DATALOCATION(value)
      - BELOW 24-bit DSA
      - ANY either 31-bit or 24-bit DSA
        - Application program must be linked AMODE(31)

Software – virtual storage...

- Program definition parameters
  - EXEC CICS GETMAIN with FLENGTH option
    - Acquired in 24-bit DSA if program linked AMODE(24)
    - Acquired in 31-bit DSA if program linked AMODE(31)
  - Program linked RMODE(ANY)
    - Program loaded in 31-bit or 24-bit DSA

Software – virtual storage...

- SIT options to exploit 31-bit storage
  - TCT User Area (TCTUA)
    - SIT TCTUALOC=BELOW|ANY
      - BELOW 24-bit DSA
      - ANY 31-bit or 24-bit DSA
        - Application programs addressing TCTUA must be linked AMODE(31)

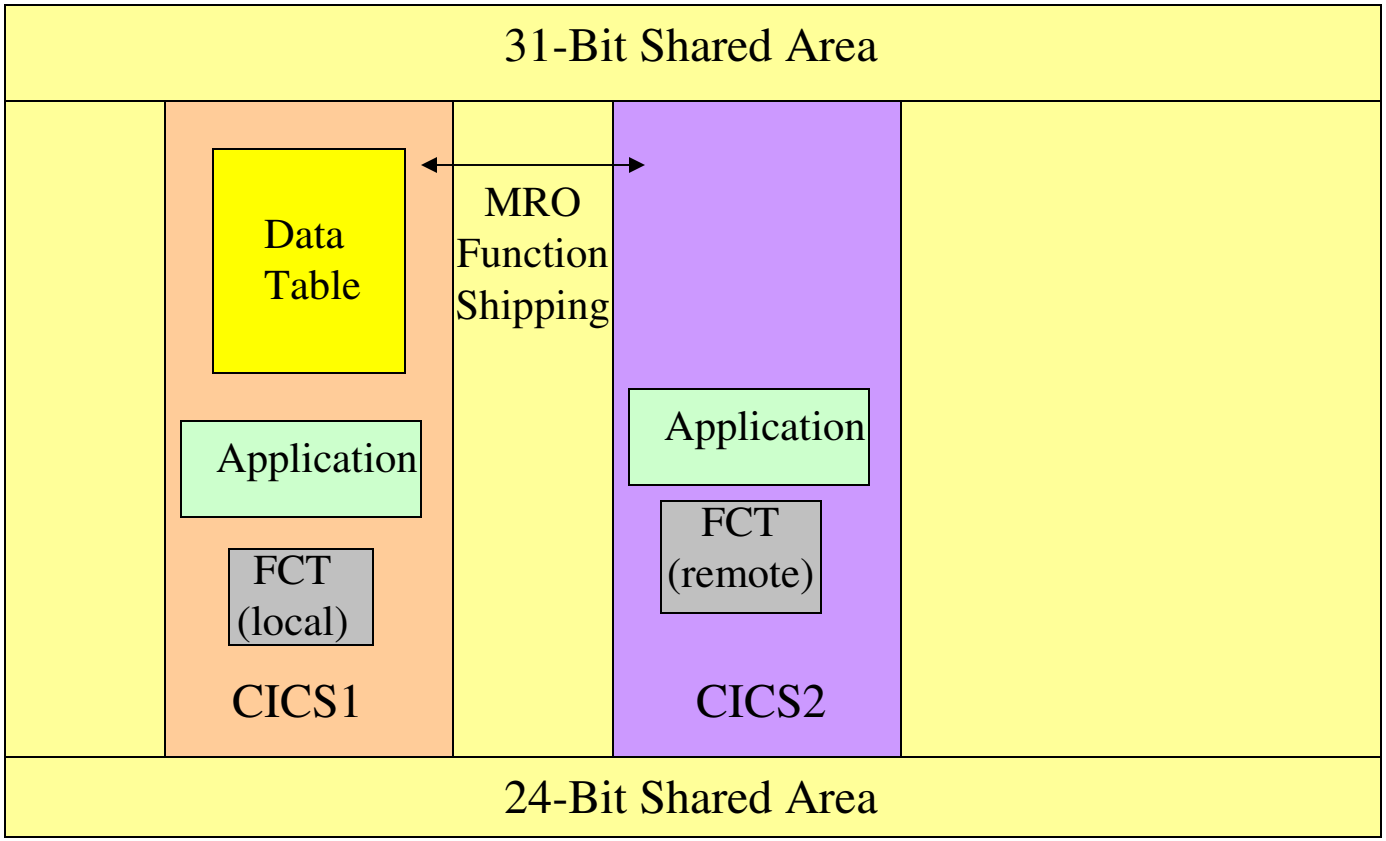
Shared Data Tables

- Data in memory option
- High performance file access
  - Read operations
    - Full key, imprecise key, and browse
  - FCT or RDO option DATATABLE=CMT|UMT
- Extends previous support in CICS/VSE
- Data Table now in VSE Data Space
  - Owned by FOR

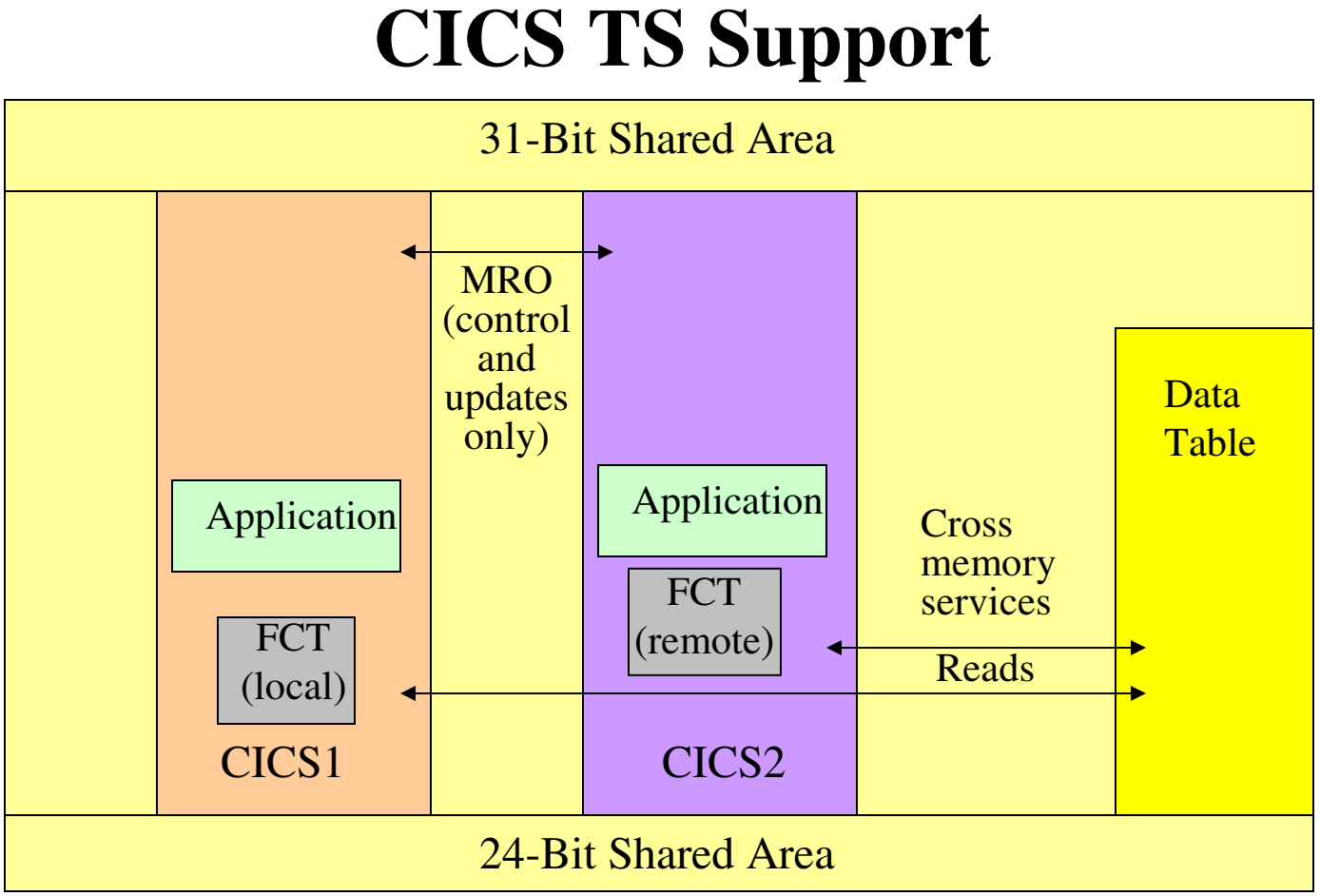
Shared Data Tables...

- Can be shared between CICS TS partitions in same VSE system
  - Cross memory services for read data access
  - Requires MRO between CICS partitions
    - Control functions
    - File updates

Shared Data Tables...

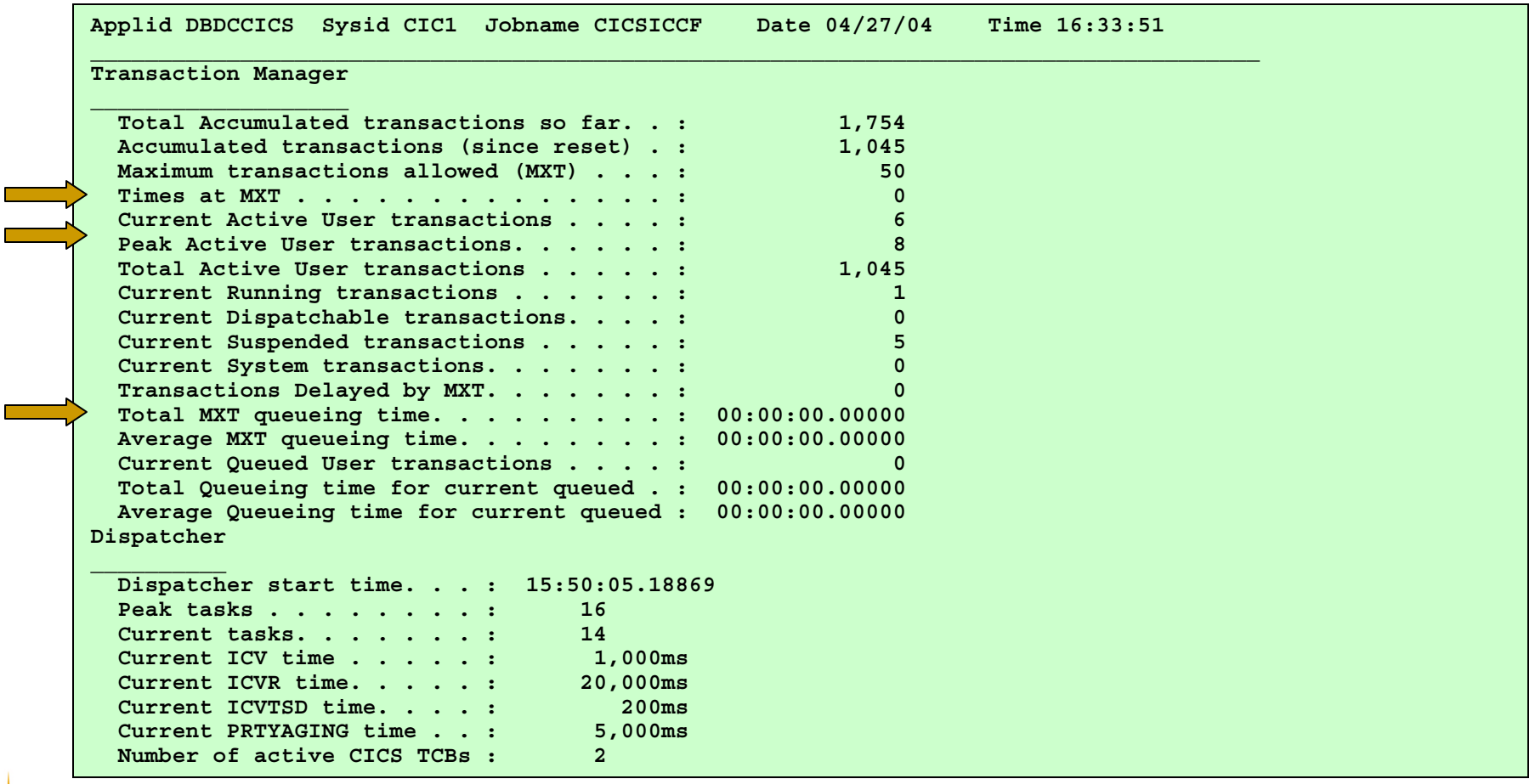


Shared Data Tables...



Monitoring CICS Performance

MXT statistics



```
Applid DBDCCICS  Sysid CIC1  Jobname CICSICCF    Date 04/27/04    Time 16:33:51
_____________________________________________________________________________
Transaction Manager
_____________________
  Total Accumulated transactions so far. . :           1,754
  Accumulated transactions (since reset) . :           1,045
  Maximum transactions allowed (MXT) . . . :              50
  Times at MXT . . . . . . . . . . . . . . :               0
  Current Active User transactions . . . . :               6
  Peak Active User transactions. . . . . . :               8
  Total Active User transactions . . . . . :           1,045
  Current Running transactions . . . . . . :               1
  Current Dispatchable transactions. . . . :               0
  Current Suspended transactions . . . . . :               5
  Current System transactions. . . . . . . :               0
  Transactions Delayed by MXT. . . . . . . :               0
  Total MXT queueing time. . . . . . . . . :  00:00:00.00000
  Average MXT queueing time. . . . . . . . :  00:00:00.00000
  Current Queued User transactions . . . . :               0
  Total Queueing time for current queued . :  00:00:00.00000
  Average Queueing time for current queued :  00:00:00.00000
Dispatcher
__________
  Dispatcher start time. . . :  15:50:05.18869
  Peak tasks . . . . . . . . :      16
  Current tasks. . . . . . . :      14
  Current ICV time . . . . . :       1,000ms
  Current ICVR time. . . . . :      20,000ms
  Current ICVTSD time. . . . :         200ms
  Current PRTYAGING time . . :       5,000ms
  Number of active CICS TCBs :       2
```

Monitoring CICS Performance...

DSA storage statistics

```
Partition size established from ALLOC parameter . . :      51,199K
Storage BELOW 16MB

  Partition GETVIS area size under 16 Mb  . . . . . :      12,284K
    Partition GETVIS used area below 16 Mb  . . . . :       8,676K
    Partition GETVIS free area below 16 Mb  . . . . :       3,608K
    Partition GETVIS maximum used below 16 Mb . . . :      12,284K
    Partition GETVIS largest free area  below 16 Mb . :     3,596K

  Current DSA Limit . . . . . :       5,120K
  Current Allocation for DSAs . :     2,304K
  Peak Allocation for DSAs. . . :     2,304K
                                       CDSA              UDSA              SDSA              RDSA
  Current DSA Size. . . . . :           512K              256K            1,024K              512K
  Current DSA Used. . . . . :           396K               40K              768K              344K
  Current DSA Used as % of DSA. :        77%               15%               75%               67%
* Peak DSA Used . . . . . :           396K               92K              776K              344K
  Peak DSA Size . . . . . :           512K              256K            1,024K              512K
  Cushion Size. . . . . :              64K               64K               64K               64K
  Free Storage (inc. Cushion) . :     116K              216K              256K              168K
* Peak Free Storage . . . . . :       160K              252K              272K              168K
* Lowest Free Storage . . . . . :     116K              164K              248K              168K
  Largest Free Area . . . . . :       104K              180K              240K              144K
  .
  Getmain Requests. . . . . :       5,366            14,079               184                 0
  Freemain Requests . . . . . :     5,351            14,069               132                 0
  .
  Times no storage returned . . :         0                 0                 0                 0
  Times request suspended . . . :         0                 0                 0                 0
  Current requests suspended. . :         0                 0                 0                 0
  Peak requests suspended . . . :         0                 0                 0                 0
  Requests purged while waiting :         0                 0                 0                 0
  Times Cushion released. . . . :         0                 0                 0                 0
  Times Short-On-Storage. . . . :         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
  Access. . . . . :                    CICS              CICS              CICS          READONLY
  '*' indicates values reset on last DSA Size change
```

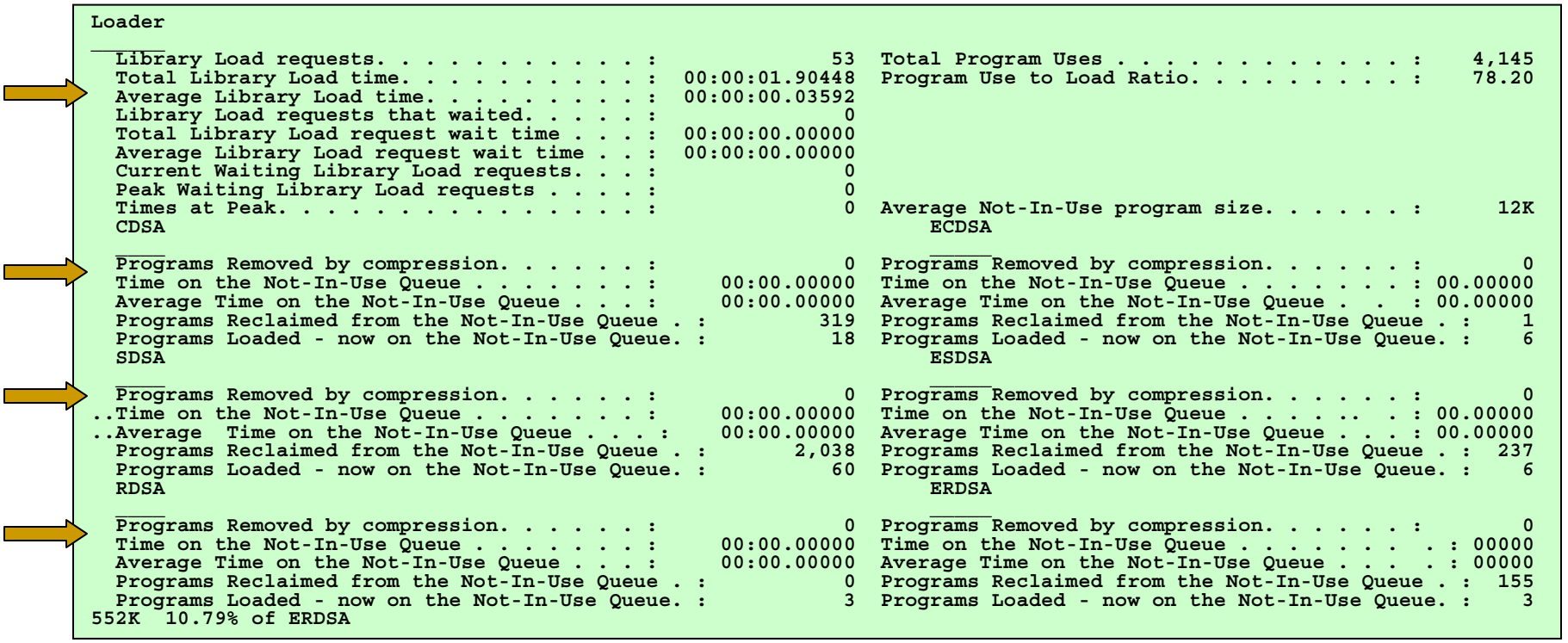
Monitoring CICS Performance...

DSA storage statistics

```
Storage ABOVE 16MB

 Partition GETVIS area size above 16 Mb  . . . . . :      38,912K
   Partition GETVIS used area above 16 Mb  . . . . . :      28,284K
   Partition GETVIS free area above 16Mb . . . . . :      10,628K
   Partition GETVIS maximum used above 16 Mb . . . . :      28,564K
   Partition GETVIS largest free area above 16 Mb  . :      14,188K

 Current EDSA Limit. . . . . :      25,600K
 CICS Trace table size . . . . . . . . . . . . . :          80K
 Current Allocation for EDSAs. :      10,240K
 Peak Allocation for EDSAs . . :      10,240K
                                        ECDSA              EUDSA              ESDSA              ERDSA

 Current DSA Size. . . . . :          3,072K             1,024K             1,024K             5,120K
 Current DSA Used. . . . . :          2,344K                64K               232K             5,060K
 Current DSA Used as % of DSA. :         76%                6%                22%                98%
* Peak DSA Used . . . . . :          2,384K                64K               232K             5,060K
 Peak DSA Size . . . . . :          3,072K             1,024K             1,024K             5,120K
 Cushion Size. . . . . :              128K                 0K               128K               256K
 Free Storage (inc. Cushion) . :      728K               960K               792K                60K
* Peak Free Storage . . . . . :       808K             1,024K               912K               192K
* Lowest Free Storage . . . . . :     688K               960K               792K                60K
 Largest Free Area . . . . . :        716K               960K               792K                56K
 .
 Getmain Requests. . . . . :         39,105               615                  6                  4
 Freemain Requests . . . . . :       34,557               611                  0                  0
 .
 Times no storage returned . . :           0                  0                  0                  0
 Times request suspended . . . :           0                  0                  0                  0
 Current requests suspended. . :           0                  0                  0                  0
 Peak requests suspended . . . :           0                  0                  0                  0
 Requests purged while waiting :           0                  0                  0                  0
 Times Cushion released. . . . :           0                  0                  0                  0
 Times Short-On-Storage. . . . :           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
 Access. . . . . :                      CICS               CICS               CICS           READONLY
 '*' indicates values reset on last DSA Size change
```

Monitoring CICS Performance...

Program load and compression statistics



```
Loader

  Library Load requests. . . . . :              53  Total Program Uses . . . . . :    4,145
  Total Library Load time. . . . . :  00:00:01.90448  Program Use to Load Ratio. . . . . :    78.20
  Average Library Load time. . . . . :  00:00:00.03592
  Library Load requests that waited. . . . . :               0
  Total Library Load request wait time . . . :  00:00:00.00000
  Average Library Load request wait time . . :  00:00:00.00000
  Current Waiting Library Load requests. . . :               0
  Peak Waiting Library Load requests . . . . :               0
  Times at Peak. . . . . :               0  Average Not-In-Use program size. . . . . :      12K
  CDSA                                          ECDSA

  Programs Removed by compression. . . . . :               0  Programs Removed by compression. . . . . :         0
  Time on the Not-In-Use Queue . . . . . :     00:00.00000  Time on the Not-In-Use Queue . . . . . : 00.00000
  Average Time on the Not-In-Use Queue . . . :     00:00.00000  Average Time on the Not-In-Use Queue . . : 00.00000
  Programs Reclaimed from the Not-In-Use Queue . :         319  Programs Reclaimed from the Not-In-Use Queue . :     1
  Programs Loaded - now on the Not-In-Use Queue. :          18  Programs Loaded - now on the Not-In-Use Queue. :     6
  SDSA                                          ESDSA

  Programs Removed by compression. . . . . :               0  Programs Removed by compression. . . . . :         0
..Time on the Not-In-Use Queue . . . . . :     00:00.00000  Time on the Not-In-Use Queue . . . . . : 00.00000
..Average  Time on the Not-In-Use Queue . . . :     00:00.00000  Average Time on the Not-In-Use Queue . . . : 00.00000
  Programs Reclaimed from the Not-In-Use Queue . :       2,038  Programs Reclaimed from the Not-In-Use Queue . :   237
  Programs Loaded - now on the Not-In-Use Queue. :          60  Programs Loaded - now on the Not-In-Use Queue. :     6
  RDSA                                          ERDSA

  Programs Removed by compression. . . . . :               0  Programs Removed by compression. . . . . :         0
  Time on the Not-In-Use Queue . . . . . :     00:00.00000  Time on the Not-In-Use Queue . . . . . : 00000
  Average Time on the Not-In-Use Queue . . . :     00:00.00000  Average Time on the Not-In-Use Queue . . . : 00000
  Programs Reclaimed from the Not-In-Use Queue . :               0  Programs Reclaimed from the Not-In-Use Queue . :   155
  Programs Loaded - now on the Not-In-Use Queue. :               3  Programs Loaded - now on the Not-In-Use Queue. :     3
552K  10.79% of ERDSA
```

Monitoring CICS Performance...

Transaction statistics

Transactions

Tran id	Tran Class	Program Name	Dynamic	Task Data Location/Key	Attach Count	Restart Count	Dynamic - Local	Counts Remote
CATA		DFHZATA	Static	Any/CICS	3	0	0	0
CATD		DFHZATD	Static	Any/CICS	1	0	0	0
CEDA		DFHEDAP	Static	Any/CICS	3	0	0	0
CEMT		DFHEMTP	Static	Below/CICS	3	0	0	0
CSPQ		DFHTPQ	Static	Any/CICS	17	0	0	0
DITT	DFHTCL03	DITDITO	Static	Below/USER	1	0	0	0
FS	DFHTCL04	FILESTAT	Static	Below/USER	1	0	0	0
IE$1		IESICCF	Static	Below/USER	159	0	0	0
IE$2		IESICCF	Static	Below/USER	7	0	0	0
IEA$		IESLIBA	Static	Below/USER	2	0	0	0
IEC$		IESLIBC	Static	Below/USER	3	0	0	0
IECA		IESCNSA	Static	Below/USER	5	0	0	0
IECM		IESCNSM	Static	Below/USER	69	0	0	0
IECN		IESCONSL	Static	Below/USER	105	0	0	0
.								
.								
.								
INW0		INWMRXS0	Static	Below/USER	2	0	0	0
INW1		INWMRXS1	Static	Below/USER	4	0	0	0
MENU		SAMPCMNU	Static	Below/USER	2	0	0	0
PF3		IESFPEP	Static	Below/USER	11	0	0	0
STAT		DFH0STAT	Static	Any/USER	2	0	0	0
TELC		TELNET01	Static	Below/USER	1	0	0	0
TELN		TELNET01	Static	Below/USER	1	0	0	0
TELR		TELNET01	Static	Below/USER	1	0	0	0
TELW		TELNET01	Static	Below/USER	8	0	0	0
2RPS		DFH0CRPS	Static	Any/USER	1	0	0	0
Totals					1,045	0	0	0

Monitoring CICS Performance...

Program statistics

Programs

Program Name	Data Loc	Exec Key	Times Used	Times Fetched	Total Fetch Time	Average Fetch Time	Times Newcopy	Times Removed	Program Size	Program Location
DFH$STAS	Any	USER	2	1	00.02888	00.02888	0	0	290	ESDSA
DFH$STCN	Any	USER	139	1	00.00566	00.00566	0	0	1,218	ESDSA
DFHACP	Any	CICS	2	0			0	0	9,578	ECDSA
DFHAMP	Any	CICS	36	0			0	0	121,952	ERDSA
DFHDBMS	Any	CICS	1	1	00.02958	00.02958	0	0	890	ECDSA
DFHDBP1$	Any	CICS	1	0			0	0	5,012	ERDSA
DFHDMP	Any	CICS	58	0			0	0	41,608	ERDSA
DFHEDAD	Any	CICS	3	0			0	0	117,898	ERDSA
DFHEDAP	Any	CICS	3	0			0	0	3,146	ERDSA
DFHEDFBR	Any	CICS	1	1	00.06118	00.06118	0	0	12,218	ERDSA
DFHEITMT	Any	CICS	3	1	00.11944	00.11944	0	0	27,063	ERDSA
DFHEITSP	Any	CICS	6	0			0	0	17,263	ERDSA
DFHEMTD	Any	CICS	3	1	00.12921	00.12921	0	0	93,514	ERDSA
DFHEMTP	Any	CICS	3	1	00.02865	00.02865	0	0	3,234	ERDSA
DFHPEP	Any	CICS	1	1	00.02728	00.02728	0	0	290	CDSA
.										
.										
.										
DITDITO	Below	USER	1	1	00.08553	00.08553	0	0	14,168	SDSA
DITJOBFS	Below	USER	1	1	00.01382	00.01382	0	0	1,536	SDSA
DTSICCF	Below	CICS	395	0			0	0	36,634	CDSA
FILESTAT	Below	USER	1	1	00.03590	00.03590	0	0	8,290	ESDSA
FSTATMS			1	1	00.00420	00.00420	0	0	1,529	ECDSA
IESBQP2	Below	USER	30	0			0	0	37,850	SDSA
IESBQUP	Below	USER	21	0			0	0	12,306	SDSA
IESBQUR	Below	USER	5	0			0	0	1,410	SDSA
IESCFA	Below	USER	96	0			0	0	4,410	SDSA
IESCLEAN	Below	CICS	2	0			0	0	2,554	CDSA
IESCLN1	Below	USER	2	0			0	0	434	SDSA
.										
.										
Totals			4,163	53			0	0		

Monitoring CICS Performance...

Temporary Storage statistics

```
Temporary Storage

_________________
  Put/Putq main storage requests . . . . . :       1,332
  Get/Getq main storage requests . . . . . :         176
  Peak storage used for TS Main. . . . . . :          5K
  Current storage used for TS Main . . . . :          0K
  Put/Putq auxiliary storage requests. . . :       1,357
  Get/Getq auxiliary storage requests. . . :       2,050
  Times temporary storage queue created. . :       1,669
  Peak temporary storage queues in use . . :         206
  Current temporary storage queues in use. :          11
  Items in longest queue . . . . . . . . . :         484
  Queue extension threshold. . . . . . . . :          20
  Queue extensions created . . . . . . . . :          24
  Control interval size. . . . . . . . . . :       4,096
  Control intervals in the DFHTEMP dataset :         330
  Peak control intervals used. . . . . . . :          41
  Current control intervals in use . . . . :          32
  Available bytes per control interval . . :       4,032
  Segments per control interval. . . . . . :          63
  Bytes per segment. . . . . . . . . . . . :          64
  Writes bigger than control interval size :           0
  Largest record length written. . . . . . :       3,968
  Times auxiliary storage exhausted. . . . :           0
  Number Temporary storage compressions. . :          82
  Temporary storage strings. . . . . . . . :           8
  Peak Temporary storage strings in use. . :           1
  Temporary storage string waits . . . . . :           0
  Peak users waiting on string . . . . . . :           0
  Current users waiting on string. . . . . :           0
  Temporary storage buffers. . . . . . . . :           8
  Temporary storage buffer waits . . . . . :           0
  Peak users waiting on buffer . . . . . . :           0
  Current users waiting on buffer. . . . . :           0
```

Monitoring CICS Performance...

Transient Data statistics

```
Transient Data
_______________
  Transient data reads . . . . . :           0
  Transient data writes. . . . . :           0
  Transient data formatting writes . . . . :           0
  Control interval size. . . . . :       4,096
  Control intervals in the DFHNTRA dataset :         108
  Peak control intervals used. . . . . :           2
  Times NOSPACE on DFHNTRA occurred. . . . :           0
  Transient data strings . . . . . :           3
  Times Transient data string in use . . . :           0
  Peak Transient data strings in use . . . :           0
  Times string wait occurred . . . . . :           0
  Peak users waiting on string . . . . . :           0
  Transient data buffers . . . . . :           3
  Times Transient data buffer in use . . . :          94
  Peak Transient data buffers in use . . . :           1
  Peak buffers containing valid data . . . :           1
  Times buffer wait occurred . . . . . :           0
  Peak users waiting on buffer . . . . . :           0
  I/O errors on the DFHNTRA dataset. . . . :           0
```

Monitoring CICS Performance...

File and Data Tables statistics

Files

Filename	Access Method	Type	LSR Pool	Str Waits Max	Str Waits Total	Read Requests	Get Requests	Update Requests	Browse Requests	Add Requests	Update Requests	Delete Requests	Data EXCPs	Index EXCPs
DFHCSD	VSAM		1	0	0	0	0	0	0	0	0	0	0	0
IESCNTL	VSAM	KSDS	0	0	0	96	0	0	0	0	0	0	96	96
IESPRB	VSAM	KSDS	0	0	0	2	2	0	0	2	0	0	3	0
IESROUT	VSAM	KSDS	1	0	0	0	0	0	0	0	0	0	4	4
IESTRFL	VSAM	KSDS	1	0	0	23	0	0	0	0	0	0	10	3
INWFILE	VSAM	KSDS	1	0	0	42	10	2	52	2	0	350	159	
Totals						163	12	2	52	4	0	463	262	

Data Tables - Requests

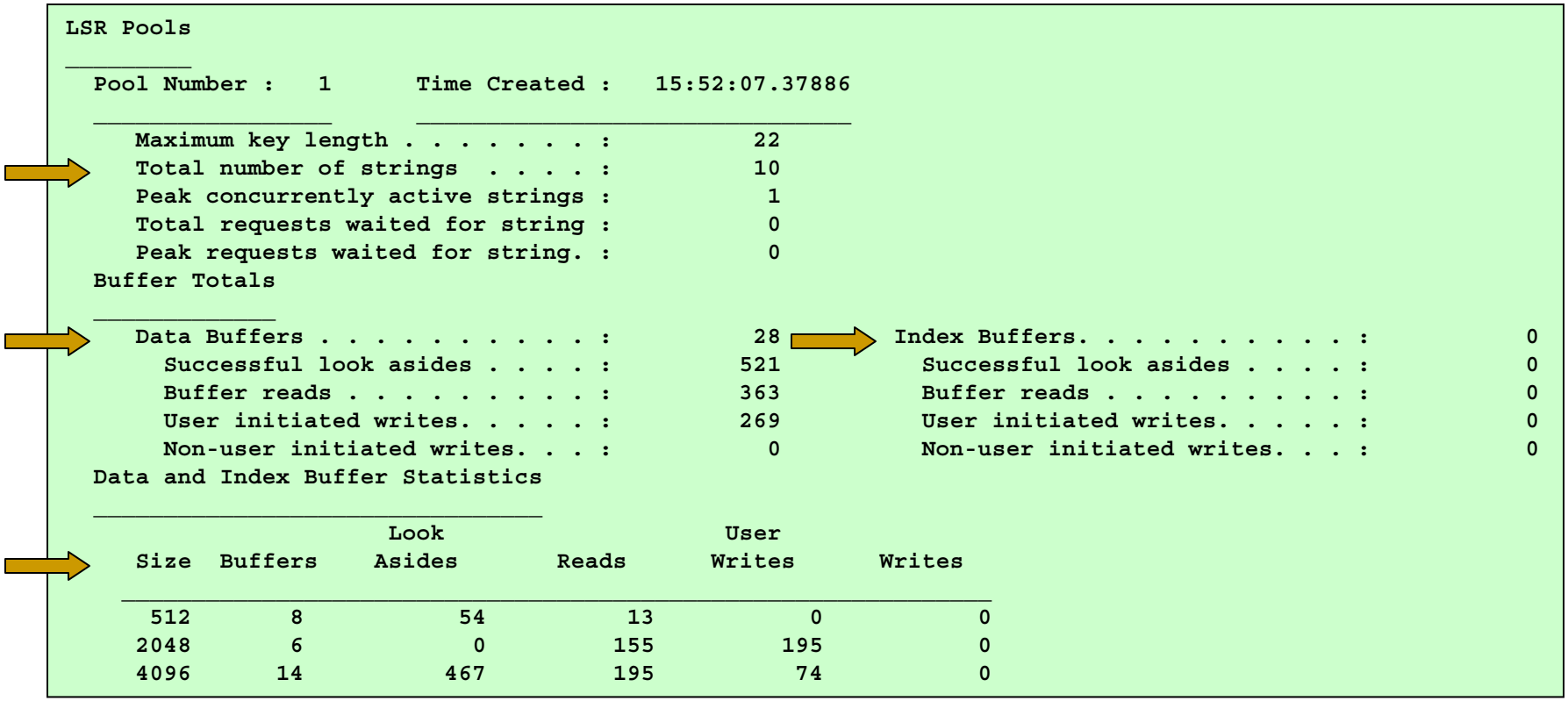
Filename	Data Table Type	Max Num recs	Successful Reads	Records Not Found	Adds via Read	Adds via API	Adds Rejected	Rewrite Requests	Delete Requests	Read Retries

Data Tables - Storage

			<---- Total ----->		<---- Entries --->		<----- Index ----->		<------ Data ------>	
Filename	Current Type Records	Peak Records	Storage Allocated	Storage In-Use	Storage Allocated	Storage In-Use	Storage Allocated	Storage In-Use	Storage Allocated	Storage In-Use

Monitoring CICS Performance...

LSR pool statistics



```
LSR Pools
_________
  Pool Number :   1      Time Created :   15:52:07.37886
  _________________      ____________________________________
     Maximum key length . . . . . . . :          22
     Total number of strings  . . . . :          10
     Peak concurrently active strings :           1
     Total requests waited for string :           0
     Peak requests waited for string. :           0
  Buffer Totals
  _____________
     Data Buffers . . . . . . . . . . :          28     Index Buffers. . . . . . . . . . :          0
       Successful look asides . . . . :         521       Successful look asides . . . . :          0
       Buffer reads . . . . . . . . . :         363       Buffer reads . . . . . . . . . :          0
       User initiated writes. . . . . :         269       User initiated writes. . . . . :          0
       Non-user initiated writes. . . :           0       Non-user initiated writes. . . :          0
  Data and Index Buffer Statistics
  _______________________________
                          Look                        User
     Size  Buffers       Asides       Reads        Writes       Writes
    ____________________________________________________________________
      512       8           54          13             0            0
     2048       6            0         155           195            0
     4096      14          467         195            74            0
```

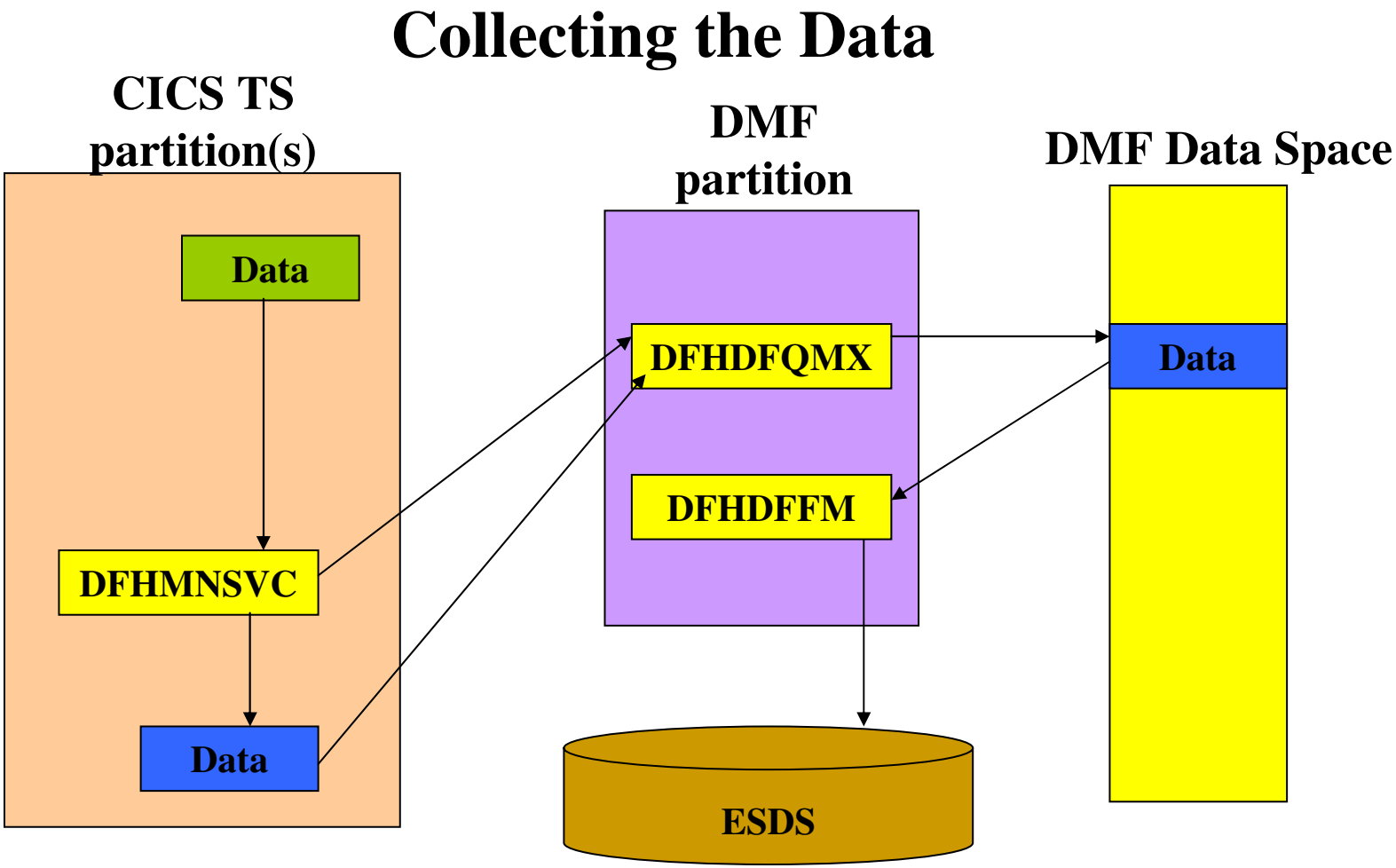
Monitoring CICS Performance…

- Options for collecting/reporting statistics
  - Data Management Facility (DMF)
    - Statistics recorded automatically or at user request
    - Print using DFHSTUP
  - User program for selected statistics
    - System Programming Interface command
    - At user request
  - Sample program DFH0STAT
    - Output to VSE/POWER LST queue or TS
    - At user request

Monitoring CICS Performance…

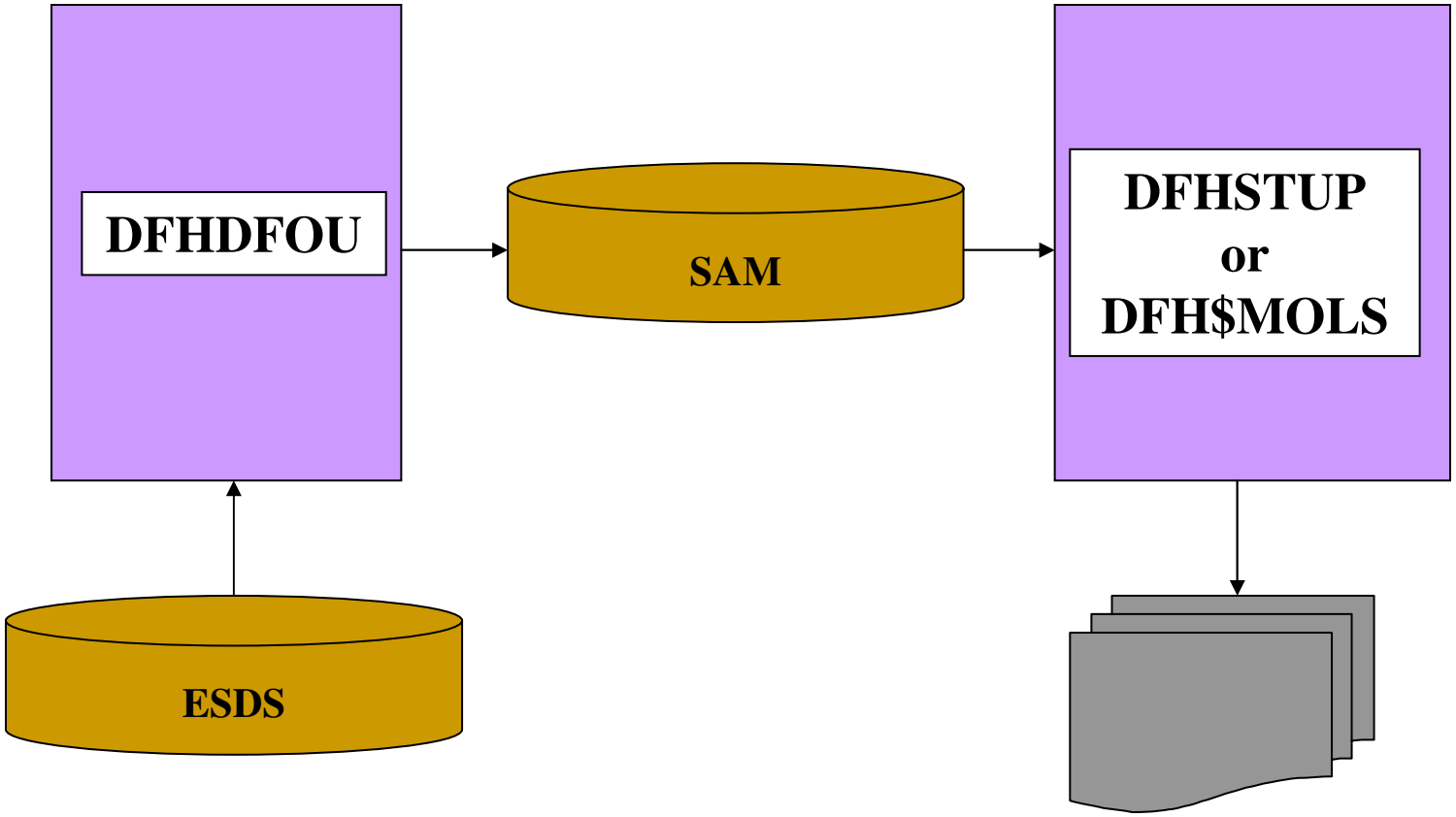
- What gets recorded by DMF
  - Automatically
    - Interval Statistics
      - Only with initialization parameter STATRCD=ON
      - User specified interval - default is 3 hours
      - Calculated forward from midnight (3 AM, 6 AM, 9 AM,etc)
    - End of Day Statistics
      - User specified - default is midnight
      - Shutdown - normal or immediate
    - Unsolicited Statistics
      - For dynamically allocated and de-allocated resources
        - Files, LSRPOOLS, transactions, programs, etc.

Monitoring CICS Performance…



Monitoring CICS Performance…

Offloading and Processing the Data



Monitoring CICS Performance…

- Sample program DFH0STAT.C
  - COBOL for VSE/ESA source in PRD1.BASE
  - Uses EXEC CICS COLLECT STATISTICS commands
  - Output to
    - VSE/POWER LST queue using Report Controller
    - CICS Temporary Storage queue
  - Can be executed
    - From terminal
    - From PLT during CICS shutdown
    - As a STARTed transaction

Summary

- Performance of CICS TS system depends on may factors
- Similar tuning options as CICS/VSE 2.3 but several new options
- More support to improve CICS performance
  - 31-bit storage exploitation
  - Shared Data tables

Other Sources of Information

- CICS TS Performance Guide
- IBM Redbooks
  - Migration to VSE/ESA 2.4 and CICS Transaction Server for VSE/ESA 1.1 (SG24-5595)
  - Implementation of VSE/ESA 2.4 and CICS Transaction Server for VSE/ESA 1.1 (SG24-5624)
- CICS Transaction Server Website
  - www-4.ibm.com/software/ts/cics
  - Manuals, flyers, brochures, etc.