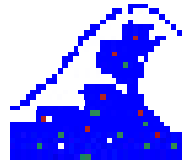


# CICS TS Performance



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Language Environment

# 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

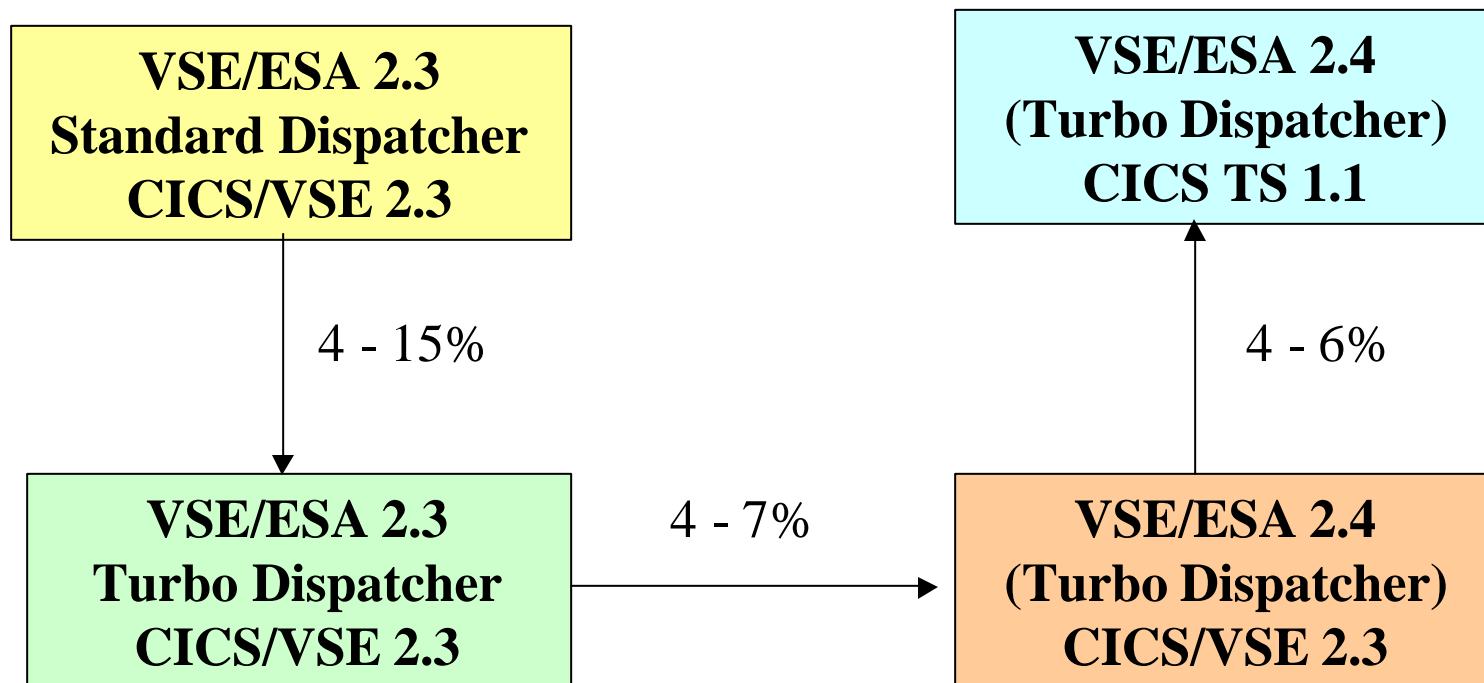


- VSE/ESA 2.4+ supports Turbo Dispatcher only
  - Uses more CPU time than standard dispatcher
- CICS TS uses more CPU time than CICS/VSE
- Review current CPU usage before migrating
  - IUI system status
  - Vendor monitoring products

# Hardware - CPU Cycles...

## ■ CPU Time Requirements

Source: CICS TS Performance Considerations document





# 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 – 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...

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- 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...



- 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 NOSPAC condition
    - | Transient data and temporary storage datasets
    - | Define secondary allocation or monitor space usage

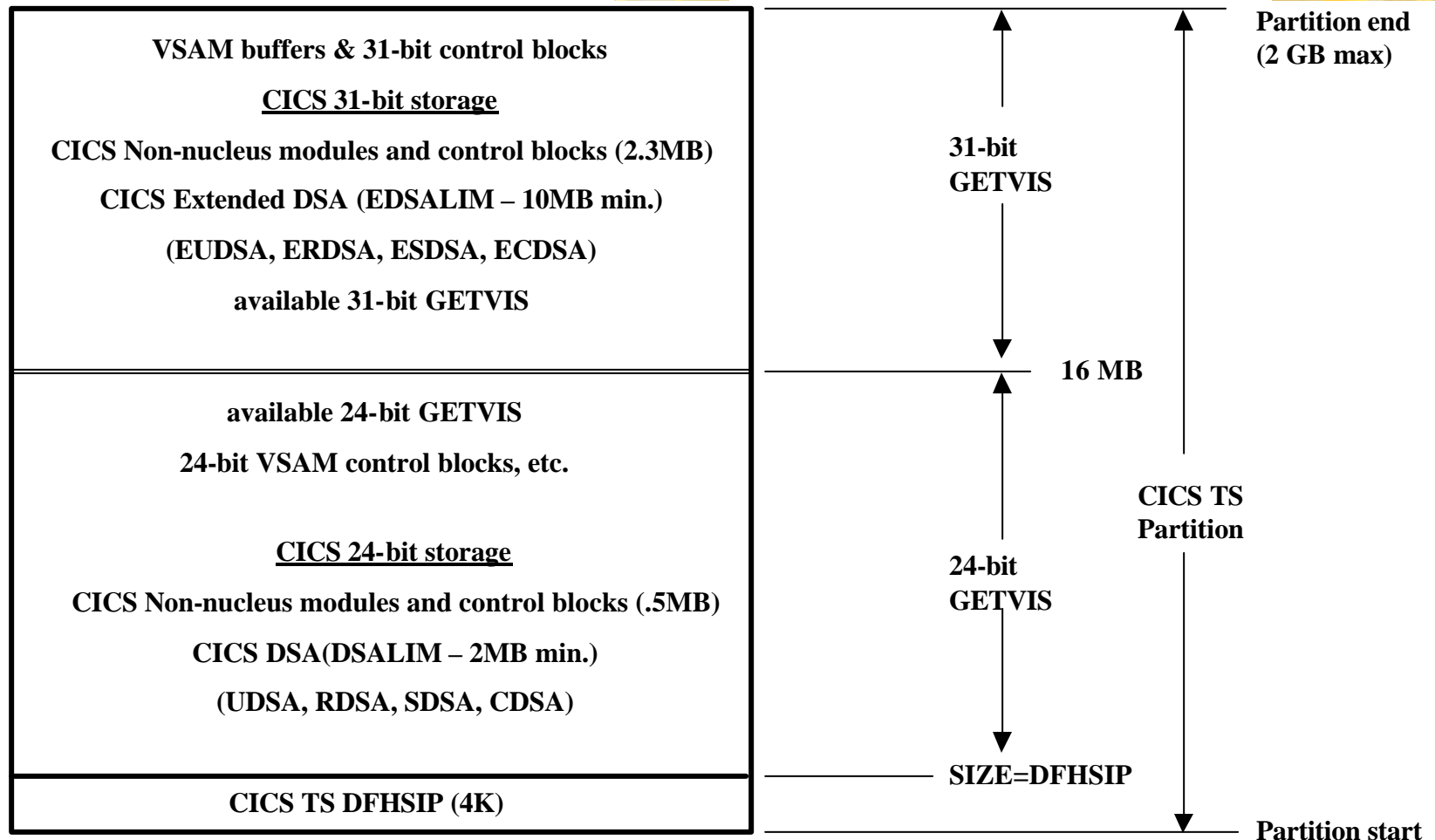
# Software – virtual storage



## ■ 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

# 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
        - 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

# 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

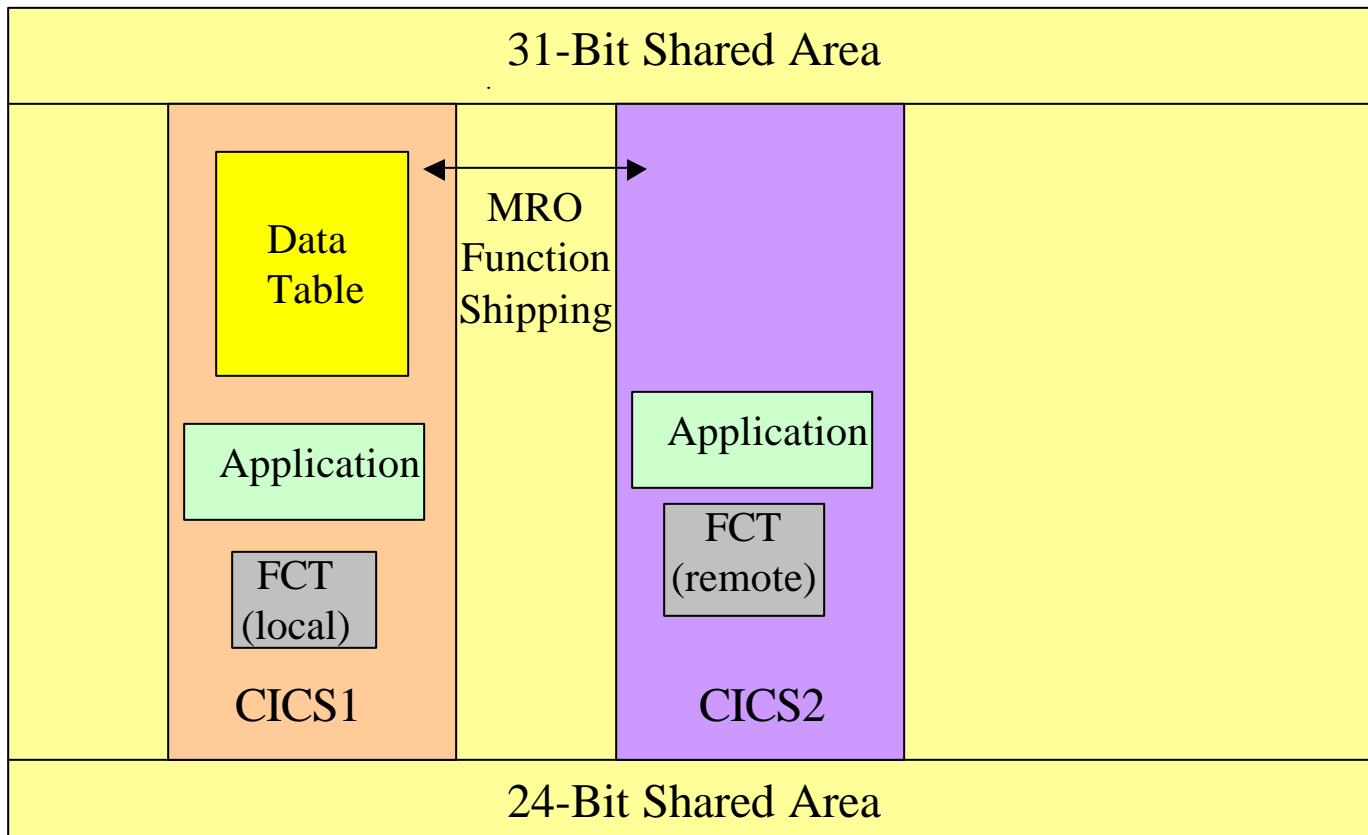
# Shared Data Tables...



- 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

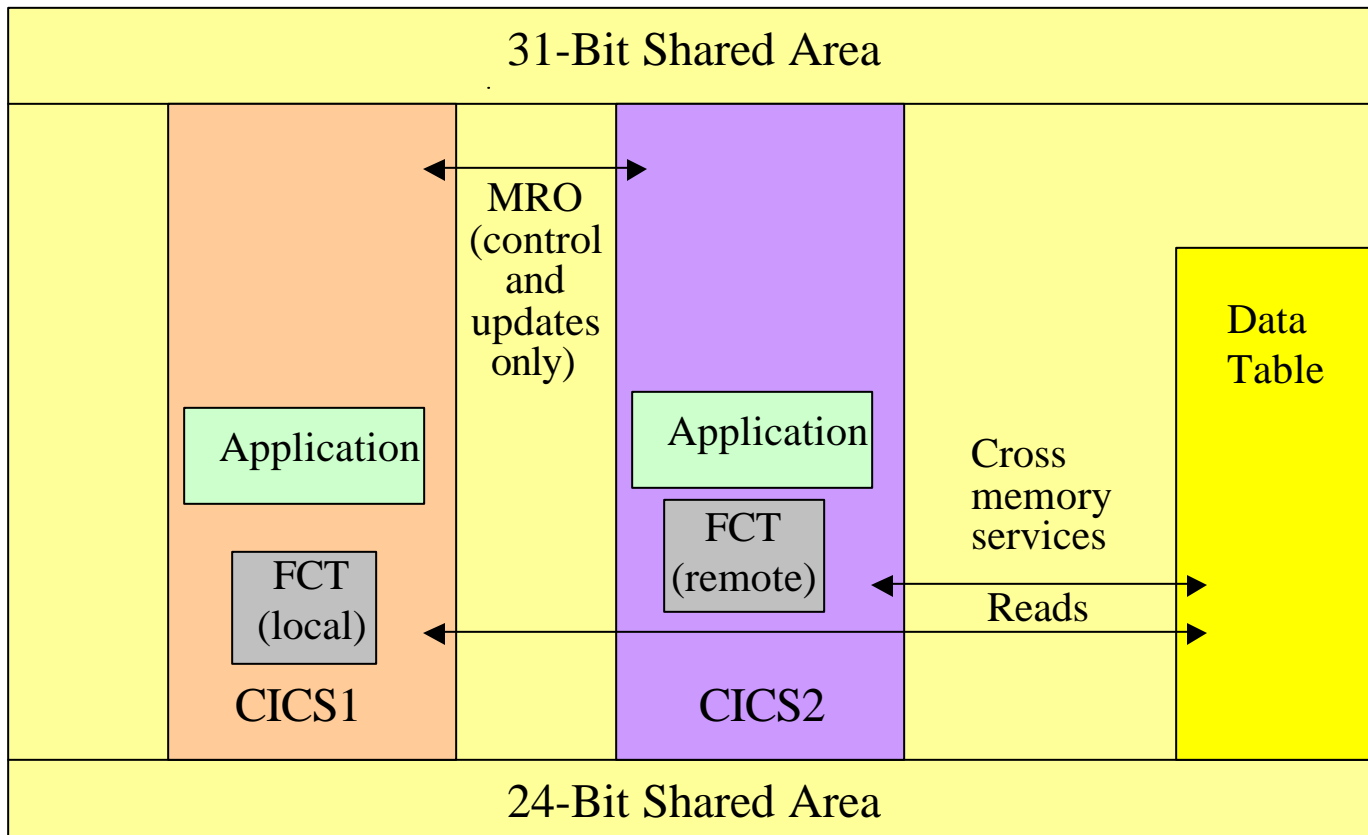
# Shared Data Tables...

## CICS/VSE Support



# Shared Data Tables...

## CICS TS Support



# Monitoring CICS Performance



- New Data Management Facility (DMF) used for collecting statistics and monitoring data
- Obsolete statistics/monitoring definitions
  - CSSM and CSSN transient data queues
  - CSTT statistics transaction
  - DFHSTM and DFHSTN statistic datasets
  - Journals for monitoring data

# Monitoring CICS Performance...



- Options for collecting/reporting statistics
  - Data passed to DMF for recording
    - | Created 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

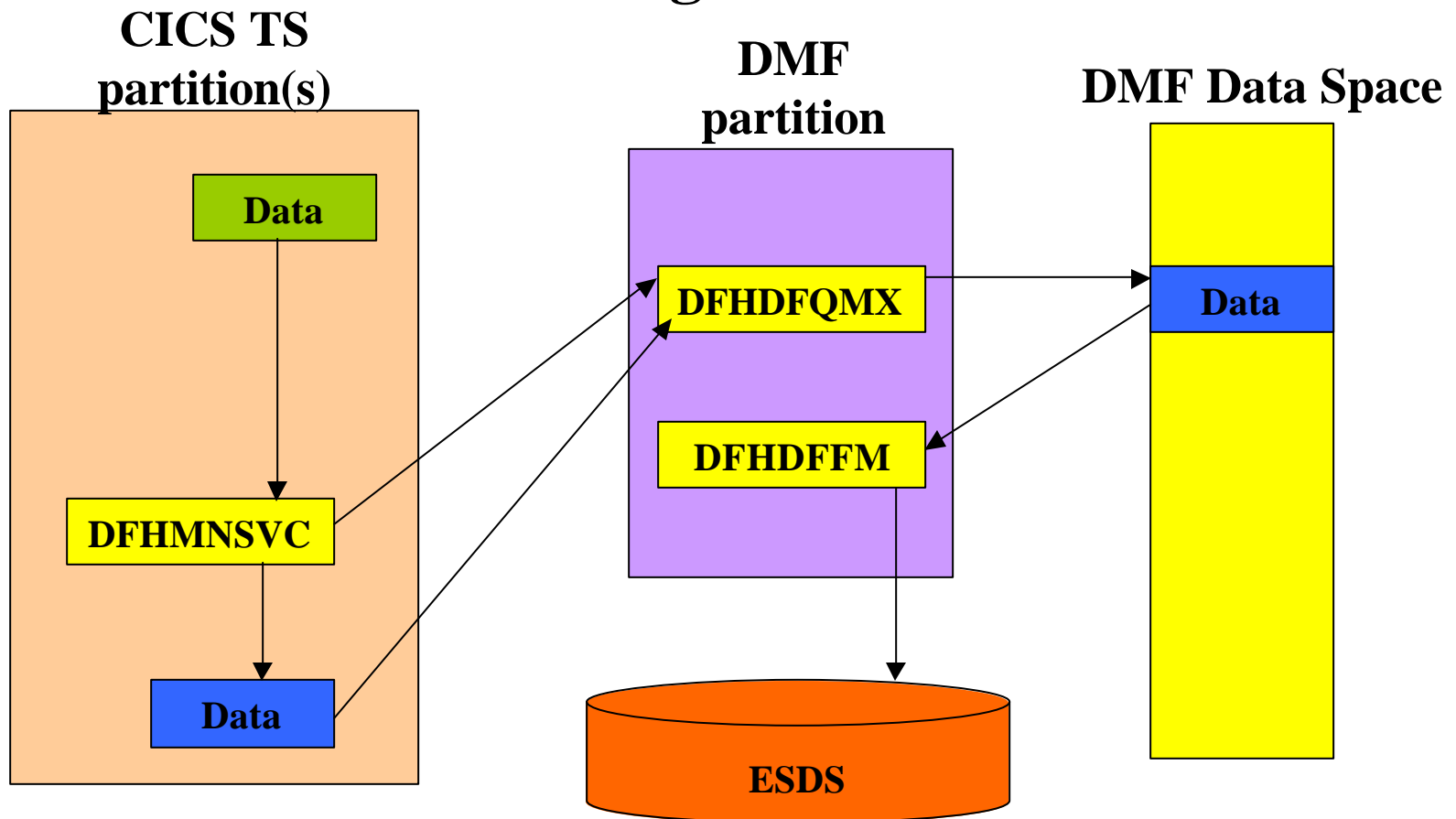
- User specified - default is midnight
- Shutdown - normal or immediate

#### ┆ Unsolicited Statistics

- For dynamically allocated and de-allocated resources
  - Files, LSRPOOLS, transactions, programs, etc.

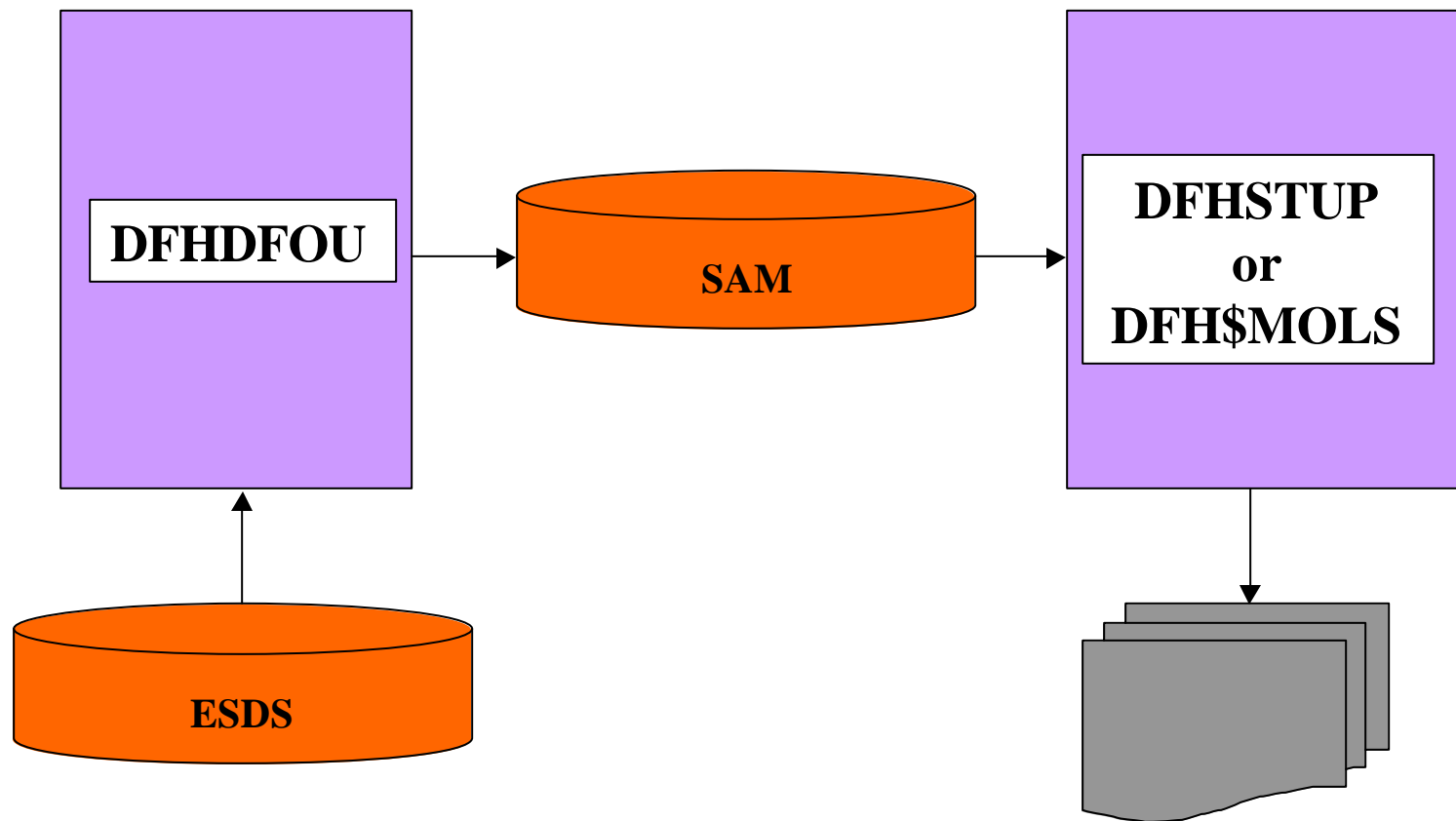
# Monitoring CICS Performance...

## Collecting the Data



# 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 many 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

# Available CICS TS Classes



- CICS TS Tuning and Problem Determination  
- A3732

- Getting the best performance from CICS TS
- Handling dumps, abends, traces, and so forth
- Hands-on machine labs
- 3 day class

WAVV	4/17-19
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Dallas	6/19-21
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Atlanta	8/12-14
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# Available CICS TS Classes...



- CICS TS Under the Covers - A3733
  - Using new function in CICS TS
  - Understanding more about how it works
  - Hands-on machine labs
  - 2 day class
    - Dallas            6/17-18
    - Atlanta           8/15-16

# Available CICS TS Classes...



- CICS TS Migration - A3731

- What you need to know to migrate to CICS TS

- Hands-on machine labs

- 3 day class

- Chicago      5/6-8

- Atlanta      7/17-19



# Other Sources of Information



- 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](http://www-4.ibm.com/software/ts/cics)
  - Manuals, flyers, brochures, etc.