Advanced Technical Skills (ATS) North America

CICS Transaction Server z/OS Health Check
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Boston Share

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Agenda

- **Exploitation**
- **Early Warning/Exception & Performance Reporting**
- **Data Collection**
- **Hints & Tips**
- **Summary**

It's 2010: What is the Health of your CICS…

- **Infrastructure**
  - New Processors
  - Larger Memory
  - Software
- **Application**
  - Some New
  - Some not so New
  - Languages
- **Access**
  - Traditional
  - Web

- **Exploitation**
  - Threadsafe
  - Shared Data Tables
  - VSAM RLS
  - CICS SMF data to a Logstream
  - CICS Coupling Facility Exploitation
  - Sysplex optimized workload management

Implementing Threadsafe

- **Migrating the application programs will improve performance, reduce your CPU cost per transaction and exploit System z architecture**
  - Additional application programming interfaces (API's) have been made threadsafe since first introduced in CICS TS V2
  - In CICS TS V3.2 file control and WMQ requests are threadsafe.

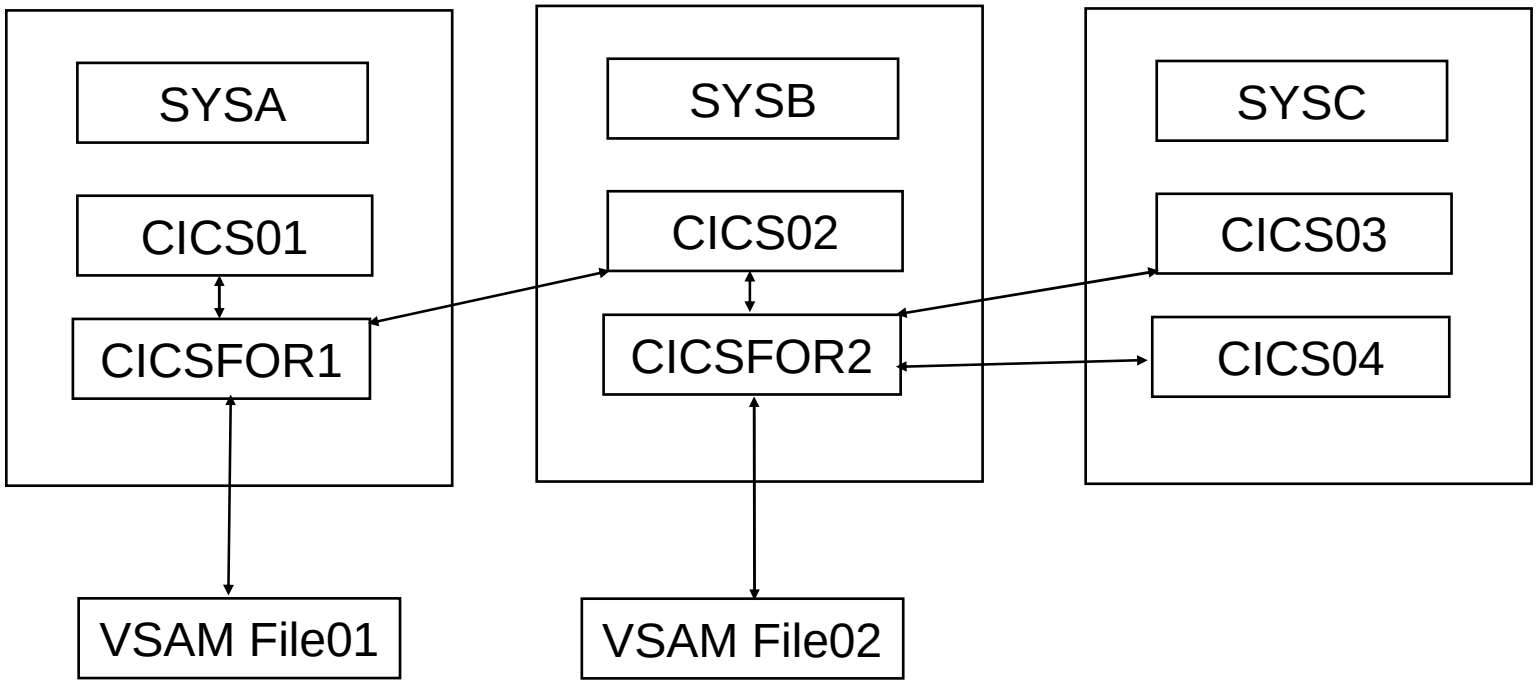
- **Download Redbook SG24-6351-02 - Threadsafe Considerations for CICS**
- **Review and make exit points threadsafe.**
- **Create a plan to migrate the applications to run in a threadsafe mode to exploit the technology installed.**
- **Use CICS Performance Analyzer and CICS Interdependency Analyzer tools to assist in the implementation of threadsafe.**
- **Ensure all new application programs are written to threadsafe standards.**

http://www-01.ibm.com/software/success/cssdb.nsf/cs/CPOR-7PP83P?OpenDocument&Site=swzseries&cty=en_us

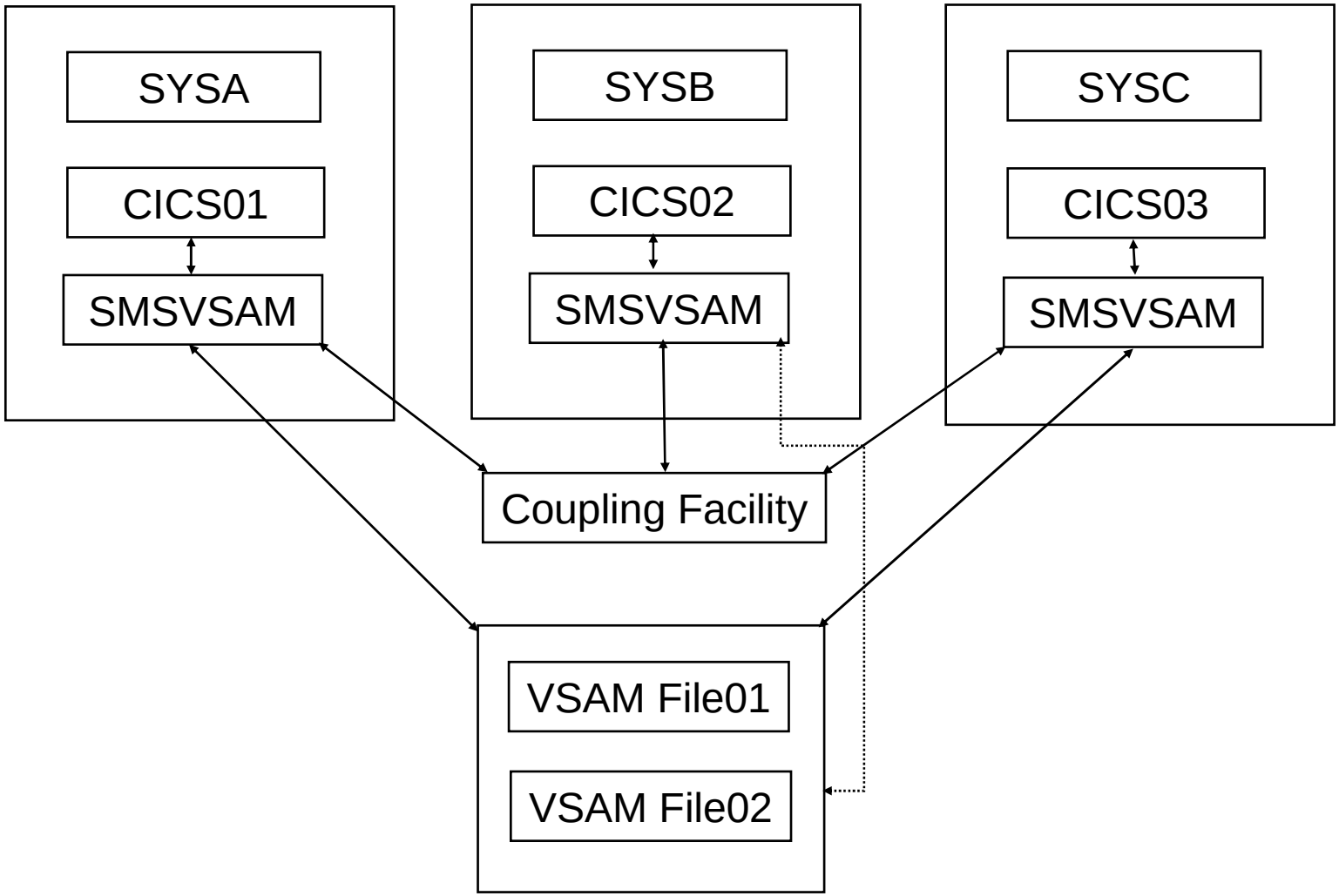
CICS Shared Data Tables

- **CICS-maintained data table is a data table whose records are automatically reflected in the source data set; when you update the file, CICS changes both the source data set and the data table.**
- **User-maintained data table is a data table whose records are not automatically reflected in the source data set; when you update the file, CICS changes only the data table.**
  - Lets you optimize the benefits of using a data table by allowing you to eliminate activity on the source data set, for update requests as well as read requests.
- **The limitation of a 2GB data table was eliminated in CICS TS V3.2.**
  - Currently a data table may now be up to 100 2GB data spaces.
  - Using the XDTRD exit to control what data to be loaded, the size of the data table could be optimized for storage and file usage.

CICS Transaction Server without VSAM RLS



CICS Transaction Server with VSAM RLS



VSAM record-level sharing (RLS)

- **VSAM RLS enables data sharing across multiple systems in a Parallel Sysplex.**
- **VSAM RLS is a data set access mode that allows CICS, batch, and non-CICS applications that run in multiple address spaces and on multiple z/OS systems to access data at the same time.**
- **VSAM RLS is designed for online transaction processing with CICS Transaction Server and applications that use VSAM data sets.**
- **With VSAM RLS, multiple CICS systems can directly access a shared VSAM data set.**
- **CICS provides the logging, commit, and rollback functions for VSAM recoverable files.**
- **VSAM uses the coupling facility (CF) to provide record-level serialization and cross-system caching.**
- **IBM CICS VSAM Recovery (CICSVR) recovers lost or damaged VSAM data sets.**

CICS SMF Type 110 Data Can Be Recorded to z/OS System Logger

- **z/OS 1.9 allows SMF data to be recorded to z/OS System Logger**
  - Merge SMF data from multiple systems in a parallel sysplex in real time
  - Separate SMF data by record type into separate streams, allowing recording to DASD by parallel processes
  - Supports much higher data rates
  - Can use either CF structures or DASD-only log streams
- **Review WP101130 “z/OS System Management Facilities (SMF) Recording with MVS Logger”**

CICS Coupling Facility Exploitation

- **Temporary storage data sharing**
  - Better availability
  - Avoid intertransaction affinities
- **Coupling facility data tables**
  - Provide a method of file data sharing, using CICS file control, without the need for a file-owning region, and without the need for VSAM RLS support.
  - Designed to provide rapid sharing of working data within a sysplex, with update integrity.
- **Named counters**
  - Provides a facility for generating unique sequence numbers for use by application programs in a Parallel Sysplex environment.

Sysplex Optimized Workload Management CICS TS V4.1

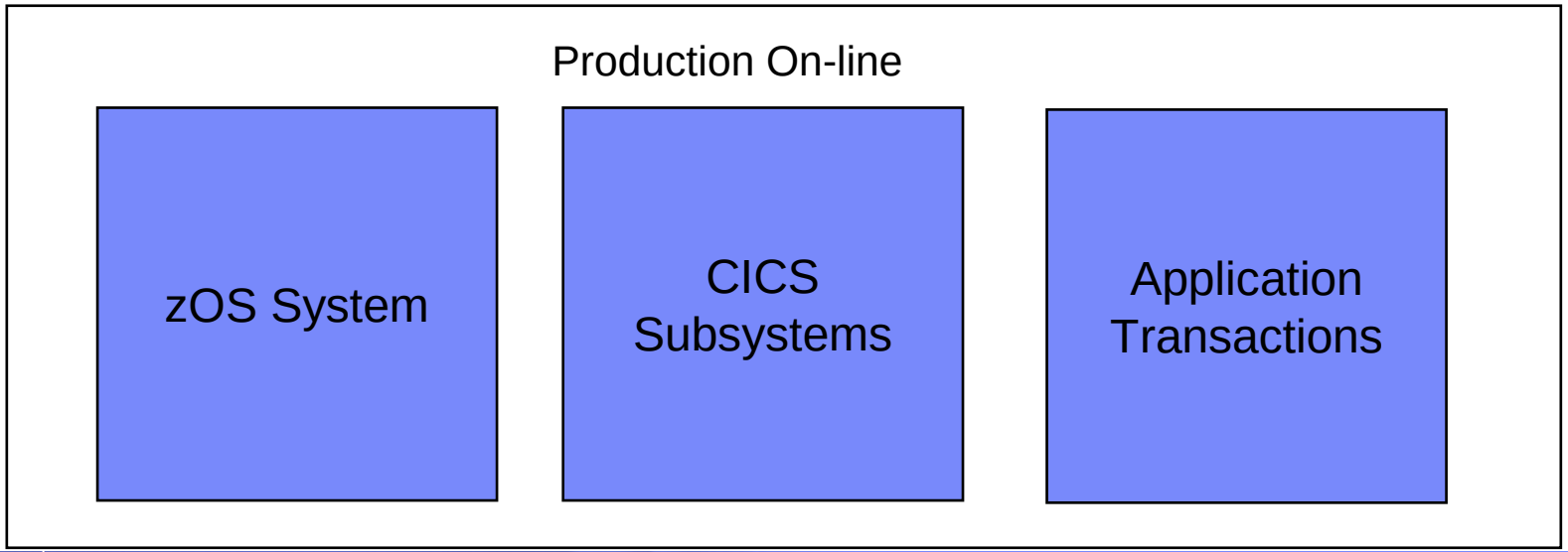
- **Exploitation of the z/OS coupling facility to improve cross-sysplex routing of distributed workloads**
- **Improved recognition of CICS region status for more efficient WLM routing decisions**
- **Additional WUI views that can assist with problem determination in route selection**
- **Dynamic tuning of CICSPlex SM workload manager resource consumption in the coupling facility**

- youtube.com - http://www.youtube.com/watch?v=RpS2h4jZdsU
  - Performance comparison between CICS TS V3.2 and CICS TS V4.1 and CICS TS V4.1 with WLM

- **Early Warning Performance Reporting**
- **Data Collection**
- **Demo**
- **Tools to Process the Data**

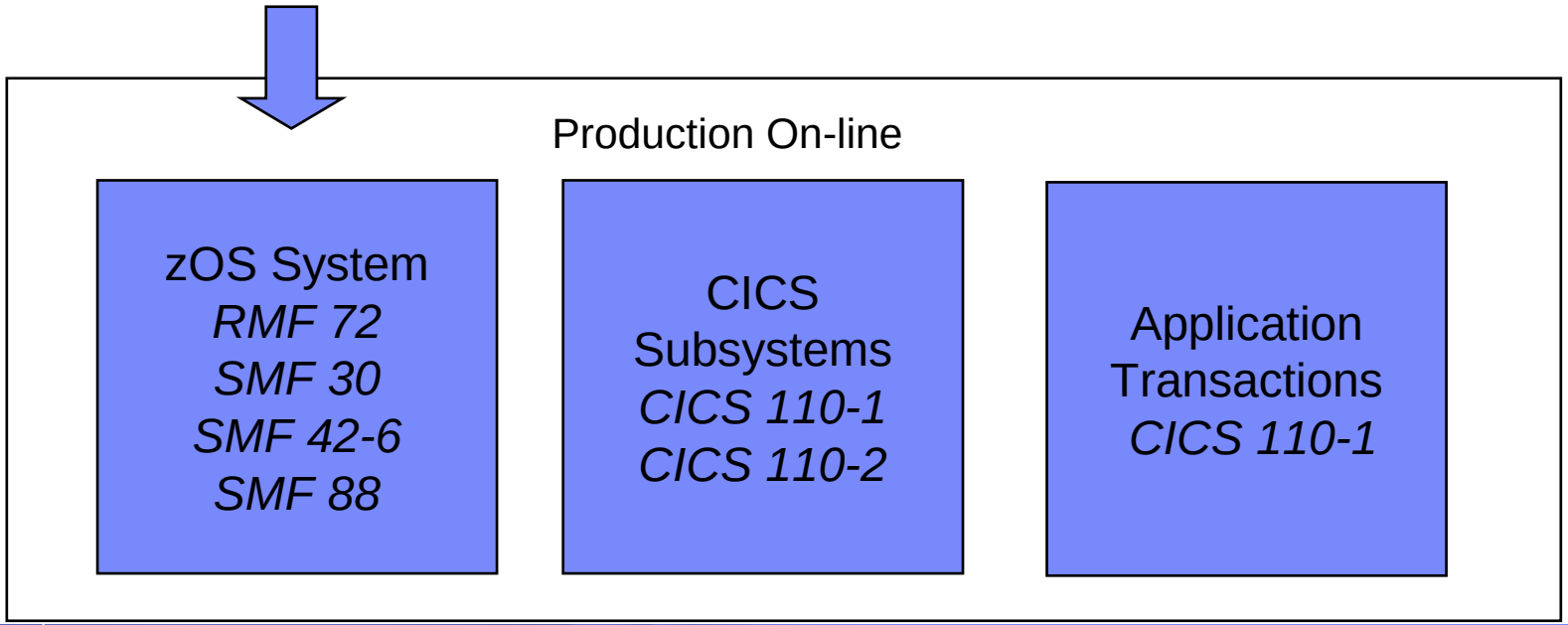
Today data is being collected from zOS system, CICS Subsystems and transactions during all hours of operation.

- Data is captured from many places about the performance of the CICS on-line workload
- One can be overwhelmed about this data and wonder where to start in reporting



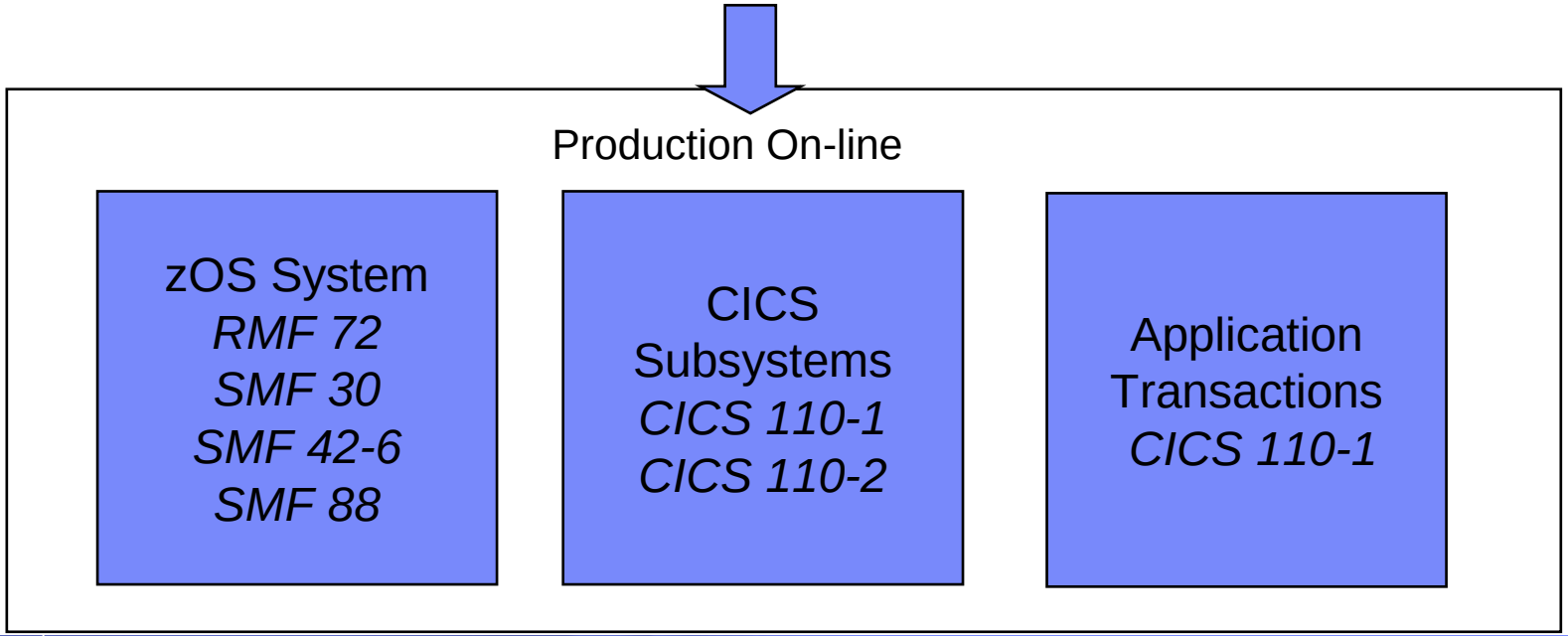
Reporting for early warning of performance problems can be done with the data already being collected from the zOS system

- Workload activity reporting from the RMF 72 data information at a high level to understand number of transactions as well as response times
- Interval CPU consumption can be monitored from the SMF 30 address space data
- Dataset level performance data is available from the SMF 42-6
- Logger information is available from the SMF 88



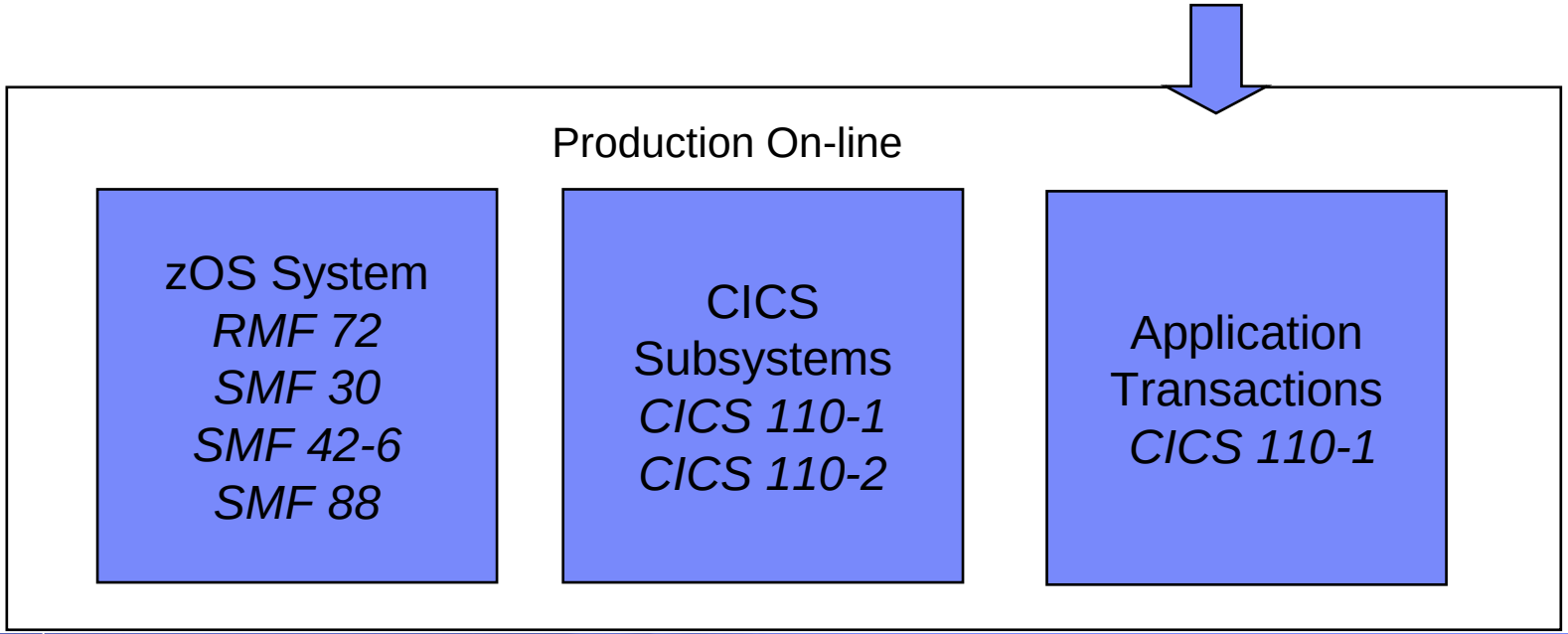
Reporting for early warning of performance problems can be done with the data already being collected from the CICS Subsystems

- Using the CICS Performance data (CICS 110-1) performance of the CICS address spaces such as average, 95% and total times need to be reported for; response time, total CPU, QRTCB and L8TCB.
- The statistics utility program, DFHSTUP provides a sample program (DFH0STXR) to highlight from the (CICS 110-2) data Exception, Warning and Information about the CICS address spaces.



Reporting for early warning of performance problems can be done with the data already being collected from the CICS Transactions

- Using the CICS Performance data (CICS 110-1) performance of Key CICS Transactions such as average, 95% and total times need to be reported for; response time, total CPU, QRTCB and L8TCB.



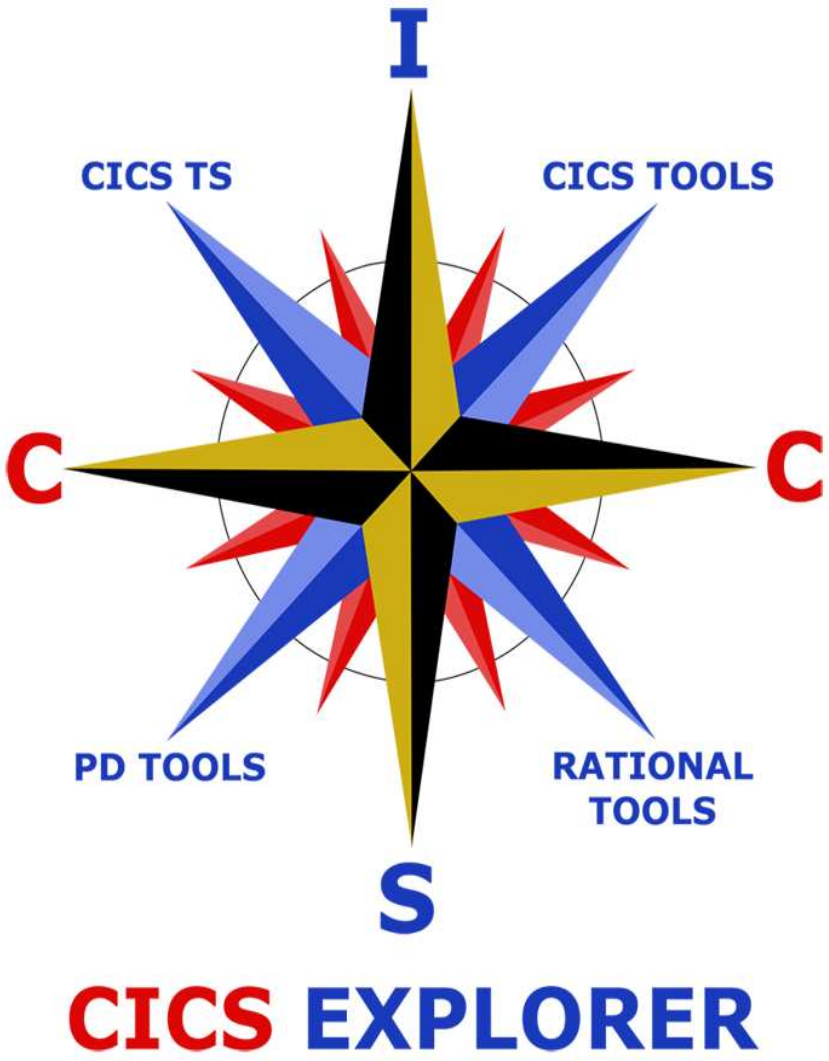
Reporting Hints and Tips

- **Assign Report classes to allowing RMF Workload reporting**
  - Key CICS address spaces
  - Key CICS Transactions
  - Logger address space
  - CICS Server address spaces
    - Temporary Storage Server
    - Coupling Facility Data Table Server
    - Named Counter Server
- **Assign a Service Class to CICS transactions even if you are not managing by response time goals**
- **The RMF Spreadsheet Reporter can be used to report on this RMF data**

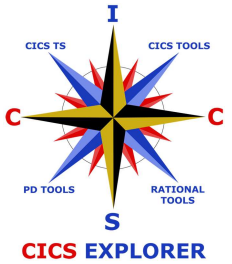
Demonstration with CICS Performance Data

- **CICS PA CSV file into a spreadsheet**
- **Applying filters**
- **Freeze**
- **Using filters**

The New Face of CICS



CICS Explorer
The New Face of CICS



- **Key features**
  - Task-oriented views provide integrated access to broad range of data and control capabilities
  - Common, intuitive, Eclipse-based environment for architects, developers, administrators, system programmers, and operators
  - Integration point for CICS TS, CICS Tools, CICS TG, PD Tools, and Rational Tools
  - Extensible by ISVs, SIs, and customers

Currently in CICS Explorer

- **CICS TS - Real-time resource status**
- **CICS IA - Resource dependency views**
- **CICS CM - Manage and Control resource definitions**
- **CICS PA - Performance data drill-down, Threadsafe analysis**
- **RDz – Powerful, context-sensitive resource editors**
- **Now available - Plug-ins for CICS TG and OMEGAMON XE for CICS**

CICS Performance Analyzer for z/OS (CICS PA)

- **Key features**
  - Comprehensive Performance Reporting and Analysis for CICS including DB2, WebSphere MQ, and MVS System Logger
  - Extensive Tabular Reports and Extract Data Sets
  - CICS Explorer
  - Historical Database (HDB)
  - Trending and Capacity Planning
  - ISPF Dialog to build, maintain, and submit reports and extracts
  - Comprehensive reporting of CICS Statistics data
  - Threadsafe metrics
- **CICS Support**
  - CICS Transaction Server for z/OS, V2, V3, and V4

New in CICS PA V3.1 (May 2009)

- **CICS TS V4.1 support and exploitation of all new CICS SMF 110 data including:**
  - **Event Processing, Atom feeds**
  - **Data Mapping Conversion, XML System Services, Web Services Addressing**
  - **IPv6, JVM Server, Dispatcher**
- **CICS Explorer plug-in extended and fully supported**
- **New and updated sample reports to support the new performance data metrics provided by CICS TS V4.1**
- **Additional enhancements delivered via the service channel**

CICS Interdependency Analyzer for z/OS (CICS IA)

- Key features
  - Run-time and batch tool for use with CICS TS for z/OS
  - Identifies resources used by CICS transactions, and their relationships to other resources
  - Consists of
    - run-time collector
    - query interface
    - batch reporter
    - load module scanner
    - CSECT scanner
    - IA Explorer

New in CICS IA V3.1 (September 2009)

- **Supports all new and updated CICS TS V4.1 resources, including Events, Atom feeds, Bundles, XML mappings, etc**
- **Fully supported plug-in for the CICS Explorer**
- **Command Flow feature**
- **Natural program interactions and ADABAS usage**
- **Migration queries for CICS TS V4.1.**
- **Collect Affinity and Dependency data at the same time**
- **Change collector options dynamically**

Hints and Tips

- **CPU Measurement**
- **PTF's & APARs**
- **Techdocs**
- **White Papers**
- **Miscellaneous Parameters**
  - DFHSIT
  - DFHMCT
  - LE Options
- **Logger Tuning**
  - Key Indicators
- **Separating system logger production and test log streams**
- **Software Currency**
- **Calculating Value of Savings**

There is a difference between the CPU time that is captured in the SMF Type 30 and CICS 110-1

- **Measurement of address space in T30 and transaction in T110.**
- **Capture percent of T30/T110 will vary by type of resources used in address spaces.**
  - TOR, AOR, FOR, DB2, MQ etc
- **The precision of time is captured in current versions of CICS**
  - CPU clock field changed from 4 bytes to 8 bytes in CICS V3.2
- **Additional time captured in CICS TS V3.2+ (T110-1)**
  - DB2, MQ, Storage Management and TCPIP
- **Uncaptured time in long running tasks (QR & CO)**
  - Set MNFREQ to something other than 0
- **Purged transactions running on an open TCB**

What is a “Transaction”

- **A transaction is an agreement, communication, or movement carried out between separate entities or objects, often involving the exchange of items of value, such as information, goods, services and money.**
- **In computer science, transaction processing is information processing that is divided into individual, indivisible operations, called transactions. Each transaction must succeed or fail as a complete unit; it cannot remain in an intermediate state.**
- **A database transaction comprises a unit of work performed within a database management system against a database, and treated in a coherent and reliable way independent of other transactions.**

Thank you Wikipedia

Understand Key Transactions

- **Data Requests driven by the transaction will affect the CPU usage**
  - This example shows that even though my CICS transactions decreased the average CPU time increased. The number of DB2 requests increased along with the L8 TCB time which is a component of total CPU time.

# Tran	AVERAGE CPU	TOTAL CPU	AVERAGE DB2 REQ	TOTAL DB2 REQ
6,295	0.035715	214.43	303	1,819,646
6,293	0.031950	203.57	271	1,730,646
6,276	0.037208	228.02	318	1,954,697
6,141	0.056881	349.68	465	2,860,112
6,135	0.051532	312.48	419	2,543,208
6,106	0.040243	249.47	327	2,029,749

- **Understand what can cause the change**
  - Application changes
  - Business changes such as special campaigns
  - Subsystem change

APAR OA24094 - In a CICS transaction isolation environment (ie. Using subspaces) high performance overhead in IAXVP doing CSP

- **CICS transaction isolation became available in CICS/ESA 4.1 and was generally not recommended as a best practice for production environments because of the performance impact.**
- **However some installations needed to implement the use in their environments to take advantage of some of the benefits provided by using transaction isolation:**
  - Reducing system outages
  - Protecting application data
  - Protecting CICS from application programs that pass invalid addresses
  - Aiding application development
- **Early implementations of this PTF have seen a reduction of 20% of processor use.**

Hiperspace buffers cause excessive real storage usage in CICS

- **Problem(Abstract)**
  - Your z/OS system has paging problems and a CICS region uses a very large amount of real storage. The region used about 200MB of real storage previously, but now uses 800MB.
- **Cause**
  - Excessive amount of Hiperspace buffers in the CICS region.
- **Resolving the problem**
  - Reduce the number of Hiperspace buffers. See Using Hiperspace buffers in the CICS Transaction Server for z/OS V3.2 information center for more information.

Technote (troubleshooting)

CICS Transaction CPU Times Increase as Processor Utilization Increases

- WP101208 “Running IBM System z at High Utilization”
- Abstract
  - **One of the strengths of the System z platform is the ability to run processors at high utilization. By design, many System z customers consistently run their processors at 90+% busy for extended periods, and some will literally run at 100%. This white paper discusses factors affecting workload performance when running at high utilization. The paper discusses system configurations and how these configurations impact the ability to run consistently at high utilization.**
- Is there a growth in CPU time per transaction at higher utilization?
  - **The simple answer is yes**
    - **Transactions processed on a system share the physical hardware resources (CPs, caches, memory buses) and software resources (z/OS, subsystems) on the system One might presume if a transaction rate of X drives a processor at 50% busy, then at 100% the processor would be able to support 2X the transaction rate, however, this will not be the case**

White Paper: WP101208

Hand me down or forgotten parameters

- **Time Value**
  - ICV, ICVR, ICVTSD, LGDFINT, PRTYAGE
- **Storage**
  - Datalocation, Tasklocation
- **Application Language Environment Options**

Run-time option	Description	Defaults Settings	Setting for lowest CPU usage	Your Setting
ALL31	Tells LE no AMODE(24) code will be running	ON	ON	
CBLPSHPOP	Changes behavior of CICS condition handling	ON	OFF	
CHECK	Activates additional code generated by the SSRANGE compile-time option	ON	OFF	
DEBUG	Generates additional code for debugging	OFF	OFF	
RPTOPTS	Generates a report of run time options used	OFF	OFF	
RPTSTG	Generates a reports on storage usage	OFF	OFF	
STORAGE	Controls whether storage is initialized to 0's	NONE,NONE,NONE,0K	NONE	
TEST	Controls how DEBUG code is generated	NOTEST	NOTEST	
TERMTHDACT	Controls the type and amount of diagnostic output produced by Language Environment for an unhandled error.	TRACE,CESE,96	MSG	
TRACE	Controls whether actions are traced	OFF	OFF	

Time value parameters

- **Interval Control Value (ICV) controls the amount of time CICS should wait when there is no work to perform.**
  - Consider increasing ICV especially for low usage CICS address space, increase to 10,000 and measure impact.
- **Interval Control Value for Runaway Tasks (ICVR) controls the amount of CPU time that is allowed to a task before returning control to CICS or cancelled with an AICA. Using the default of 5 seconds.**
  - Consider decreasing ICVR, 5 seconds in a long time on today's technology.
- **Interval Control Value for Terminal Scan Delay (ICVTSD) control the amount of time is to elapse before CICS deals with some terminal I/O.**
  - Consider decreasing ICVTSD from the default of 500 to 0.
- **Log defer interval (LGDFINT) to be used by CICS log manager when determining how long to delay a forced journal write request before invoking the MVS system logger.**
  - The default was changed from 30 to 5, 5 is a good place to start in your logstream tuning
- **Priority aging (PRTYAGE) factor is used to increase the effective priority of a task according to the amount of time it is held on a ready queue.**
  - Review the PRTYAGE setting of 5000 and consider changing to 0.

Exploitation of Storage Above the Line

- **DATALOCATION({BELOW|ANY}) – Default BELOW**
  - The program can handle only 24-bit addresses and must therefore only be given data located below the 16MB line. If necessary, data is copied below the 16MB line before passing its address to the application program.
  - Change the program definitions for high use programs to DATALOCATION(ANY)
- **TASKDATALOC({BELOW|ANY}) – Default BELOW**
  - Storage areas that CICS acquires for the transaction must be located below the 16MB line.
  - Change the transaction definitions for high use transactions to TASKDATALOC(ANY)

CICS – DFHMCT Omegamon EMPs

- **If you are not reporting on the data created by the EMPS defined in the DFHMCT: remove the entries**

```
*****************************************************************
* OMEGAMON FOR FILE LEVEL STATISTICS AND GMT OFFSET TIME IN EACH TRAN *
*****************************************************************
         DFHMCT TYPE=EMP,CLASS=PERFORM,ID=(OMEGBSC.1),
               FIELD=(1,OMEGBSC),PERFORM=(MOVE(0,132))
*****************************************************************
* OMGEAMON FOR TASK LEVEL DB2 STATISTICS                        *
*****************************************************************
         DFHMCT TYPE=EMP,CLASS=PERFORM,ID=(OMEGDB2.1),
               FIELD=(1,OMEGDB2),PERFORM=(MOVE(0,100))
*****************************************************************
* OMGEAMON ENTRIES                                              *
*****************************************************************
         DFHMCT TYPE=EMP,CLASS=PERFORM,ID=(CANWLMSC.1),
               FIELD=(1,CANWLMSC),PERFORM=(MOVE(0,16))
         DFHMCT TYPE=EMP,CLASS=PERFORM,ID=(CANMQ.1),
               FIELD=(1,CANMQ),PERFORM=(MOVE(0,76))
```

CICS - Application Language Environment Options

- **The CICS run time LE options have an impact on transaction response time and CPU consumption. Small savings on transactions that run at a high volume could have a substantial impact on resources used.**
  - The production LE options should be reviewed after migration to a newer version of LE
  - Use the CLER transaction to determine the LE options in use for a specific CICS address space.
  - Check on your version of LE options in the “z/OS V1Rn.0 Language Environment Customization”
- **STORAGE(00,00,00,0K) is very expensive because it will initialize storage to 00.**
  - Change to STORAGE(00,NONE,NONE,0) or STORAGE(00,NONE,CLEAR,0)

Does your Logger Need Tuning

- **Questions that may be an indication that your logger needs attention**
  - Are all of your CICS log streams defined the same?
  - Are all of the parameters the same for all of your log streams?
  - How often do you review the CICS log stream statistic data?
  - How often do you review the SMF 88 data?
  - Do you run production and test CICS's on the same z/OS image?
  - You have not reviewed definitions or parameters in over 5 years.
- **A process for tuning the CICS log streams need to be implemented.**
  - Monitor CICS and Log stream statistics.
  - Download Redbook SG24-6898 and Redpaper REDP-3768

Separating system logger production and test log streams

- **Starting with z/OS V1R8, you can separate log streams into two groups, production and test.**
  - Separate system logger processing for test log streams from your production work log streams on a single system.
  - Production log streams are then protected from a hang or failure in the system logger test environment.
- **Use the GROUP(PRODUCTION | TEST) parameter in the log stream definition.**
- **System logger will do data set processing, such as data set allocations, data set recalls, and other functions for the two log stream groups in two different sets of tasks.**
- **System logger limits resource consumption of TEST log streams**
- **Log streams are PRODUCTION log streams by Default.**

System logger APARS - 2010

- **OA30548: NEW FUNCTION: SYSTEM LOGGER IS ENHANCED TO SUPPORT UP TO 4GB LOGSTREAM DATA SET SIZE**
  - System Logger is enhanced to support log stream data set sizes up to 4GB (increased from the previous logger 2GB limit). This change applies to both logstream OFFLOAD and STAGING data set types.
  - Introduced the new message (IXG283i) that provides some details when log stream data sets are newly allocated
- **OA32796: SMF TYPE 88 SUBTYPE 11 RECORDS ARE BEING RECORDED WITH A BLANK STRUCTURE NAME IN THE SMF88ANM FIELD**

SMF Type 88 Key Indicators

SAB	**"BYTES DELETED INTERIM STORAGE W/DASD"** MB's deleted from interim storage after being offloaded. During the offload process, physically deleting the logically deleted data was not enough to reduce the logstream to the LOWOFFLOAD value. *A value here indicates data is being offloaded and then deleted, costing additional processing and I/O.* *For DFHLOG & DFHSHUNT the goal is to try and make this "0".*
EDS	**"DASD SHIFTs"** Number of log stream DASD shifts, this is the number of time an additional log dataset is allocated during the offload.
SWB	**"BYTES WRITTEN TO INTERIM STORAGE"** MB's written to interim storage. *Should be close to SIB.*
SIB	**"BYTES DELETED INTERIM ST W/O DASD"** MB's deleted from interim storage instead of being offloaded. Due to CICS tail trimming. Should be close to SWB.
LWB	**"BYTES WRITTEN BY USERS IXGWRITES"** MB's written by IXGWRITE
ETT	**"STG THLD"** Number of times system logger detected a staging dataset threshold hit condition, this is the number of times the HIGHOFFLOAD was reached in the staging dataset. *Okay for DASDONLY logstream, problem if in CF.*
LDB	**"BYTES WRITTEN TO DASD"** MB's written to offload DASD dataset. *This value should be very low (zero) for DFHLOG and DFHSHUNT.*
EO	**"OFFLOAD"** Number of successful offloads. For Active exploiters should not be higher than 1 every 30 seconds but should be one for one SMF interval. *Okay if triggered by HIGHOFFLOAD's (ETT) not by full condition (ETF).*
SC3	**# WRITES COMPLETED WITH 90% OF ELEMENTS FOR THE LOGSTREAM ARE IN USE** Count of type-3 completion's. Space used in the structure, by this log stream is critical but does not exceed 100%. (Only valid to CF's)

Software Currency

z/OS		V1R1 3/2001	V1R2 10/2001	V1R3 3/2002	V1R4 9/2002	V1R5 3/2004	V1R6 9/2004	V1R7 9/2005	V1R8 9/2006	V1R9 9/2007	V1R10 9/2008	V1R11 9/2009	V1R12 9/2010
CICS	ESA 4.1 10/1994	TS 1.1 11/1996	TS 1.2 10/1997	TS 1.3 3/1999	TS 2.1 3/2001		TS 2.2 1/2002		TS 2.3 12/2003		TS 3.1 3/2005	TS 3.2 6/2007	TS 4.1 6/2009
CTG							V 5.0 4/2004	V 6.0 1/2005	V 6.1 11/2005	V 7.0 12/2006	V 7.1 12/2007	V 7.2 12/2008	V 8.0 6/2010
DB2	V5 6/1997	V6 6/1999			V7 3/2001				V8 3/2004			V9 3/2007	V10 Beta 3/2010
IMS	V4 9/1992	V5 3/1995	V6 10/1997	V7 10/2000				V8 10/2002		V9 10/2004		V10 10/2007	V11 10/2009
WMQ				V5.2 11/2000			V5.3 6/2002	V5.3.1 12/2003			V6 6/2005	V7.0 6/2008	V7.0.1 9/2009
COBOL	MVS 10/1995	390 V2.1 5/1997		390 V2.2 9/2000				Enterprise V3.2 9/2002	Enterprise V3.3 2/2004		Enterprise V3.4 7/2005	Enterprise V4.1 12/2007	Enterprise V4.2 8/2009

End of Service Dates

z/OS		
Release	GA	End of Service
V 1.6	9/24/2004	9/30/2007
V 1.7	9/30/2005	9/30/2008
V 1.8	9/29/2006	9/30/2009
V 1.9	9/28/2007	9/30/2010
V 1.10	9/26/2008	
V 1.11	9/25/2009	
V 1.12	9/24/2010	

CICS Transaction Server		
Release	GA	End of Service
V 1.2	10/24/1997	12/31/2002
V 1.3	3/29/1999	4/30/2006
V 2.1	3/30/2001	6/30/2002
V 2.2	1/25/2002	4/30/2008
V 2.3	12/19/2003	9/30/2009
V 3.1	3/25/2005	
V 3.2	6/29/2007	
V 4.1	6/28/2009	

CICS Transaction Gateway for z/OS		
Release	GA	End of Service
V 5.1	4/16/2004	9/30/2008
V 6.0	1/14/2005	9/30/2010
V 6.1	11/11/2005	4/30/2011
V 7.0	12/15/2006	
V 7.1	12/7/2007	
V 7.2	12/5/2008	
V 8.0	6/18/2010	

Calculating Value of Savings

- **"A penny saved is a penny earned“**
  - Ben Franklin

Days	Hours	Seconds	Value	Savings
365	24	31,536,000	$0.01	$315,360
365	10	13,140,000	$0.01	$131,400
260	10	9,360,000	$0.01	$93,600
260	10	9,360,000	$0.05	$468,000
260	10	9,360,000	$0.10	$936,000
260	10	9,360,000	$0.25	$2,340,000
260	10	9,360,000	$0.50	$4,680,000
260	10	9,360,000	$1.00	$9,360,000

Summary

- **Exploit the technology that you have like the Coupling Facility**
- **Expand/Create Early Warning Performance Reporting**
- **Use the Proper Tools for the Job**
- **Review parameters occasionally**
- **Stay Current on Software and Maintenance**