



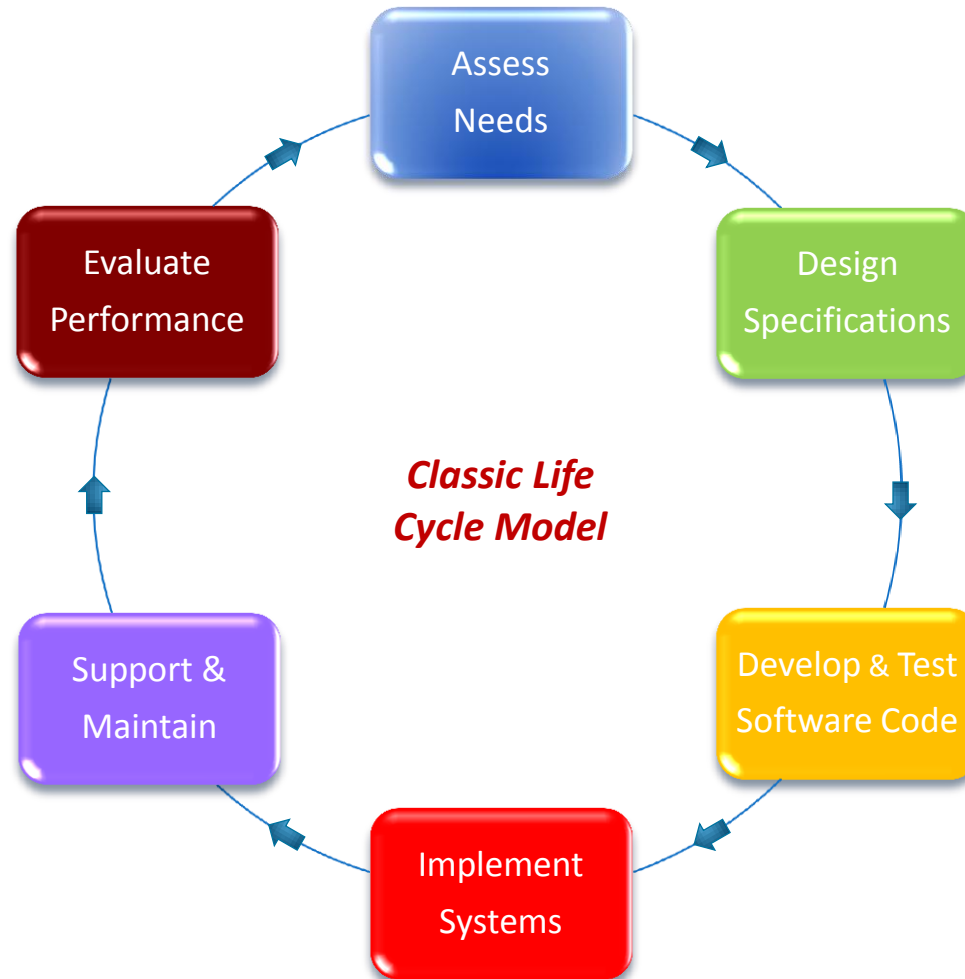
**Value-4IT**

# ***GSE UK Conference 2012: Session OJ*** ***z/OS Application Performance Tuning:*** ***A Cost Efficient & Low Overhead Solution***

# ***Introduction - Agenda***

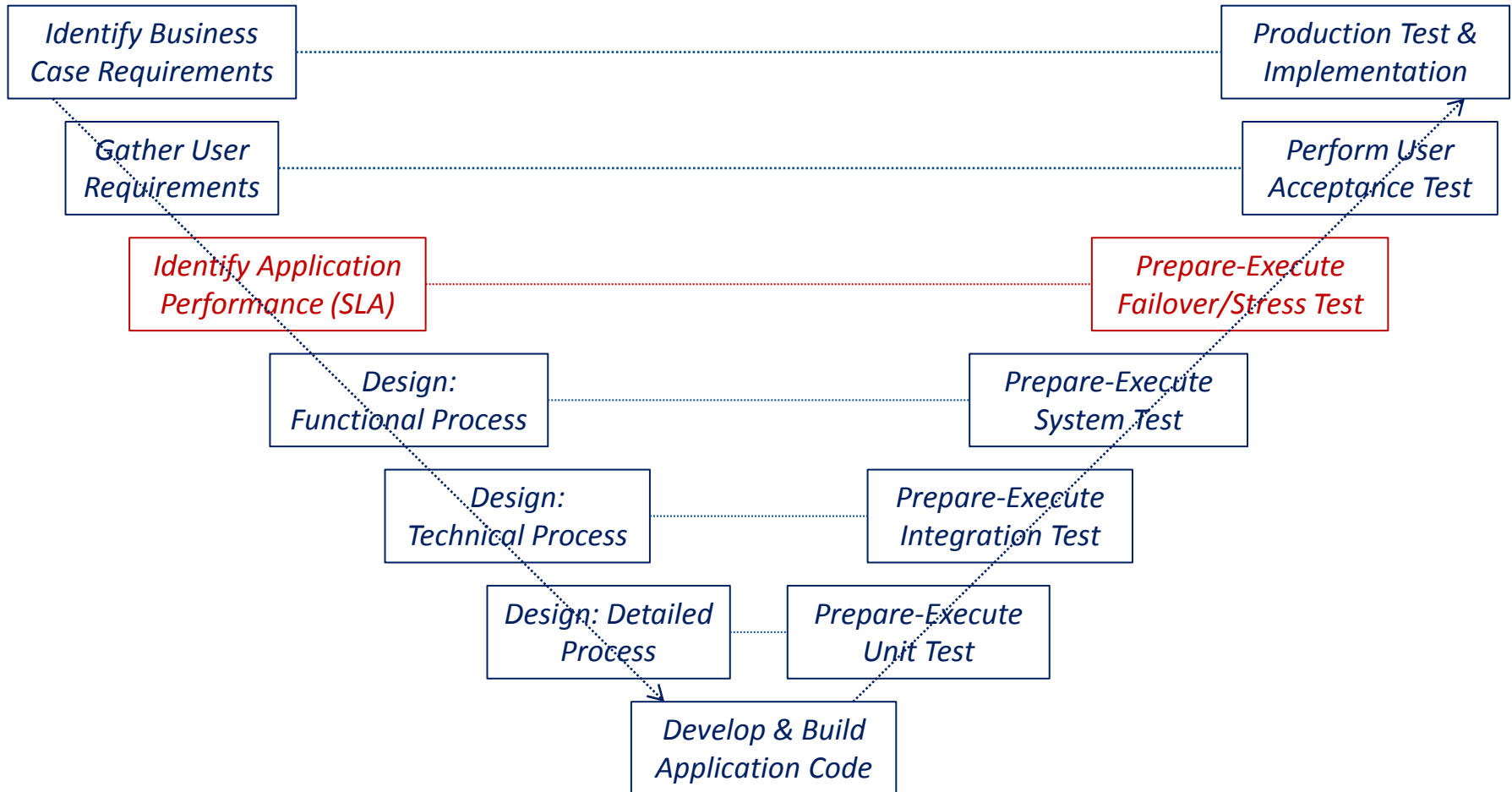
- Application Development Lifecycle: Simple & Detailed
- Application Performance Tuning: Software Costs/Business Value
- Application Performance Management (APM): ITSM & z/OS Tools
- CPU Measurement Facility (CPU MF): Introduction & Overview
- CPU MF: Activation, Considerations, Usage & Hidden Potential
- CPU MF Reprise: No Brainer Deployment Recommendations
- Application Performance: CPU MF & zHISR Benefits Summary
- CPU MF & zHISR: Useful Information Resources

# *Simple Application Development Lifecycle*



*How often do we finish the project & evaluate performance?*

# Detailed Application Development Lifecycle



**Can we really identify an SLA before Production rollout?**

# Application Performance Tuning: Software Costs

*Sample IBM zSeries Server Pricing Configurations Using Industry Standard Pricing*

75 MSU - ~500 MIPS			150 MSU - ~1000 MIPS		
Program #	Software Description	MLC	Program #	Software Description	MLC
5635DB2	DB2 for z/OS	~£15,000	5635DB2	DB2 for z/OS	~£22,500
5655M15	CICS TS for z/OS	~£16,000	5655M15	CICS TS for z/OS	~£23,500
5694A01	z/OS V1 Base	~£22,000	5694A01	z/OS V1 Base	~£40,000
<b>IBM WLC Total Monthly Cost</b>		<b>~£53,000</b>	<b>IBM WLC Total Monthly Cost</b>		<b>~£86,000</b>
<b>IBM WLC Annual Saving @ 10%</b>		<b>~£63,000</b>	<b>IBM WLC Annual Saving @ 10%</b>		<b>~£103,000</b>
<b>But, Industry Averages State ~\$2,000-\$5,000 (~£1,500-£3,500) Cost per Year for Software MIPS</b>					
<b>Total z/OS Software Annual Cost</b>		<b>~£750,000</b>	<b>Total z/OS Software Annual Cost</b>		<b>~£1,500,000</b>
<b>Total z/OS Annual Saving @ 10%</b>		<b>~£75,000</b>	<b>Total z/OS Annual Saving @ 10%</b>		<b>~£150,000</b>

- Core z/OS products are a significant component of overall cost...
- Reducing MIPS/MSU consumption is of course the biggest saving!
- MIPS/MSU prices reduce year-on-year, but software stays the same

**Even for a small user, 10% savings are conservative & worthwhile!**

# Application Performance Tuning: Business Value

<b>Industry Sector</b>	<b># MIPS per \$1M Revenue</b>	<b>MIPS Cost per \$1M Revenue</b>	<b>Hour Downtime Cost (\$ Millions)</b>	<b>Value: Pseudo Priceless Business Consideration</b>
Banking	0.98	\$8,441	1.0	➤ Customer Satisfaction
Consumer/Retail	0.19	\$2,520	1.1	➤ End User Productivity
Financial Services	1.07	\$9,574	1.4	➤ Investor Confidence
Insurance	0.33	\$3,143	1.2	➤ Goodwill & Brand Image
Manufacturing	0.21	\$2,190	1.6	➤ Lost Business (Revenue)
Telecommunications	0.85	\$6,397	2.0	➤ Regulatory Compliance
Transportation	0.23	\$3,222	0.6	➤ B2B Contracts (T's & C's)
Utilities	0.16	\$1,549	2.8	➤ Penalties/Late Fees

Source: IT Performance Engineering & Measurement Strategies - Quantifying Performance Loss, META Group

Source: Economics of Computing -The Internal Combustion Mainframe, Rubin

- No two businesses are the same, downtime cost is always subjective
- Costs can be calculated, but arguably business value is intangible
- Having happy customers and end users is the goal and priceless!

***The definition of a cynic is someone that knows the price of everything, and the value of nothing – Oscar Wilde***

# Application Performance Management: ITSM

## Technical Support



- **Capacity Plan:** System wide CPU usage via SMF/RMF data
- System/Subsystem monitors Omegamon/TMON/Sysview
- Application Performance Management (APM) tools?

*The n<sup>th</sup> line customer interface, with deep technical expertise to identify tuning potential, but not to update application code!*

## Operations



- **SLA/KPI:** Line of Business Application Service Delivery
- System/Subsystem monitors Omegamon/TMON/Sysview
- Batch Scheduling Tools TWS/CA-7/CONTROL-M...

*The 1<sup>st</sup> line customer interface, with minimal influence/control of transaction response and batch processing elapsed times.*

## Application Support



- **Application Management:** Compuware/Macro 4/IBM...
- System/Subsystem monitors Omegamon/TMON/Sysview
- Application Performance Management (APM) tools?

*The 2<sup>nd</sup> line customer interface, focused on code optimization & logic flow, as opposed to SLA & KPI “time related” metrics...*

**Who owns Application Performance Management? Does it matter?**

# ***Application Performance Management (APM) for z/OS***



Strobe Family



Application Performance Analyzer



ExpeTune



Application Tuner



TriTune



TriTune

- All the major ISV's include an APM tool in their software portfolio
- Most if not all products were architected ~10-20 years ago, pre z10
- Activating the tool in Production generates CPU overhead concerns

***A mature market of medium-high cost software that works on the fundamental premise of diagnosis by capturing CPU instructions...***



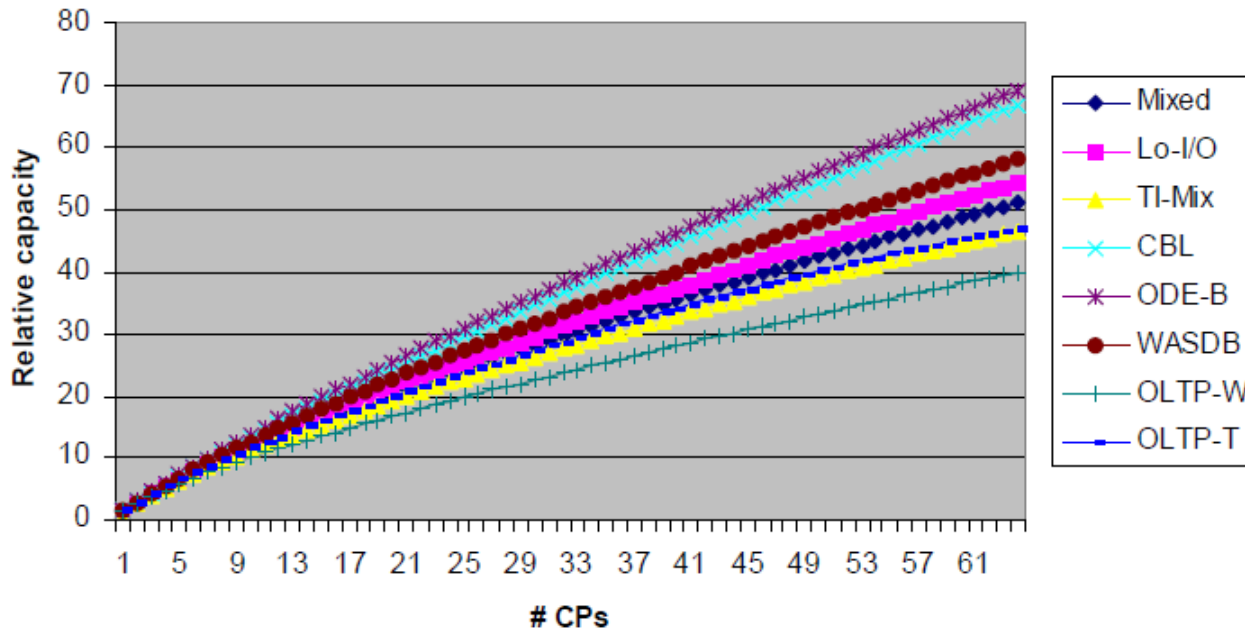
# ***CPU Measurement Facility (CPU MF): Introduction***

- Introduced with the z10 server, the CPU Measurement Facility provides optional hardware assisted collections of information about the logical CPUs work that is executed over a specified interval in selected logical partitions (LPAR).
- CPU MF does not replace existing functions (E.g. Capacity Planning, System Tuning, et al) or capabilities (E.g. SMF), but provides new function to assist with CPU optimization activities for Application Code and ISV Software tuning.
- CPU MF consists of two important, but independent, functions:
  - 1) The collection of *counters (workload)* that maintain counts of certain activities (The counters function is intended to be run on a constant basis to collect long-term performance data, in a similar manner to how you collect other performance data).
  - 2) The collection of *samples (application)* that provide information about precisely what the CPU is doing at the time of the sample (The sampling function is a short duration, precise function that identifies where CPU resources are being used, to help you improve application efficiency).
- CPU MF runs independently at the LPAR level and can run in multiple LPARs simultaneously and can be used with Central Processors (CPs), IBM System z Integrated Information Processor (zIIP), and IBM System z Application Assist Processor (zAAP).

***CPU MF is packaged in the CPU chip, easy-to-use and zero cost!***

# CPU MF: Workload Performance Observations

LSPR Workloads



Historically, LSPR workload capacity curves (primitives & mixes) had application names, being identified by a “software class” captured characteristic. However CPU, capacity performance is more closely associated with how a workload is interacting with a processor “hardware” design. With the availability of CPU MF (z10+), the ability to gain an insight into the interaction of workload and hardware profiles has arrived...

Capacity (zPCR) performance has always been more closely associated with how a workload uses and interacts with a particular processor hardware design. The challenge has been that there was no ability to get insight into the interaction of workload and hardware design. CPU MF addresses this challenge by providing information about the interaction that was not available previously.

**CPU MF delivers a Capacity Planning ability based on customer data**

# **CPU MF: z/OS Operating System Interaction (Brief)**

- 1) Ensure that the prerequisite hardware and software service levels are installed:  
*Hardware (z10, z114/z196, zEC12), Software (z/OS 1.11+ or z/OS 1.8 plus APARs)*
- 2) Authorize the collection of CPU MF data at the logical partition (LPAR) level using the HMC or SE:  
*HMC Select Processor → Recovery → Single Object Operations → System Management → CPC Operational Customization → Change LPAR Security → Choose From Several Counters Settings*
- 3) Define a User ID (RACF, ACF2, TopSecret) for the **HIS** started task:  
*No special considerations for the HIS User ID other than STC and UNIX file system (OMVS) access*
- 4) Ensure that SMF is set up to allow the collection of CPU MF SMF records:  
*Safeguard Type 113 records are not suppressed, only the SYS parameter required (not SUBSYS)*
- 5) Ensure that the HIS started task has an appropriate WLM service class:  
*HIS requires access to CPU resources and the ability to offload data to UNIX HFS @ nn MB/Minute*
- 6) Set up the UNIX file system that will contain the HIS files:  
*Define multiple file systems, one for each system; Have a unique mount point for each one; Mount (Automount) each one on the system that writes to that file system.*
- 7) Modify your SMF archiving processes to save the SMF type 113 records:  
*Safeguard that any IFASMFDP (DUMP-CLEAR) activities include the offloading of the HIS 113 record. For categorization, although RMF/CMF does not directly support the 113 record, grouping this record with other CPU related records (E.g. Type 7n) seems logical.*

## **Hardware Instrumentation Services (HIS) - z/OS CPUMF Interaction**

# CPU MF: z/OS HIS Address Space Operation Control

```
F hisproc,{BEGIN | B}  
  [{TITLE | TT} = 'textdata']  
  [,PATH='pathname']  
  [, {DDNAME | DD}=ddname]
```

**BEGIN** the HIS data collection (collect hardware event data) process  
**TITLE** (identify) the collection (E.g. Production CICS Widgets Application)  
z/OS UNIX System Services **PATH** for .MAP, .CNT and .SMP files  
Command File (**DDNAME**) for controlling (z/OS Modify) HIS parameters

```
COUNTERS keywords:  
  [{CTRONLY | }]  
  [, {CTRSET | CTR} = {ALL | (B[,P[,C[,E]]]}]  
  [, {DURATION | DUR}=duration_value in minutes]
```

**COUNTERS** indicates that this event collection is for system-wide analysis  
**CTRONLY** B (Basic)+P(Problem) default, C(Crypto) & E(Extended) options  
**CTRSET** collect only event counter set data (.CNT)  
Specify the **DURATION** in Minutes (1-1440, default 10)

```
SAMPLINGS keywords:  
  [, {BUFCNT | BUF}=bufcnt from 4 to 1024 4Kb pages]  
  [, {DATALOSS | DL}={IGNORE | STOP}]  
  [, {SAMPFREQ | SF}=freq up to 800000 ]  
  [, {SAMPTYPE | ST}=samptype either B| D]  
  [, {DURATION | DUR}=duration_value in minutes | 10]
```

**SAMPLINGS** indicates detailed event collection (Job or Address Space)  
**BUFCNT** is system calculated if not specified, to minimize event DATALOSS  
**DATALOSS** should not occur if WLM service is OK or BUFCNT is sufficient  
**SAMPFREQ** defaults to 800000 (10 Minutes), reduce for smaller CPC  
**SAMPTYPE** defaults to B(Basic), D(Diagnostic) also includes B(Basic)  
Specify the **DURATION** in Minutes (1-1440, default 10)

```
MAPS keywords:  
  [, {MAPONLY | }]  
  [, {MAPASID | MAS}={ALL | (asid1,asid2,...asid32)}]  
  [, {MAPJOB | MJOB}=(job1,job2,...jobn)]  
  [, {MAPVERBOSE | MAPV}]
```

**MAPS** indicates the granularity of load module mapping data (.MAP)  
**MAPONLY** dictates load module CSECT type analysis for an ASID or JOB  
**MAPASID** address space ID(s) for private load module data (1-32 or ALL)  
**MAPJOB** job name(s) for private load module data (1-32 (wildcards) or \*)  
**MAPVERBOSE** defaults (no), collect load module map error diagnostics

```
Misc keywords:  
  [, {SMFINTVAL | SI}={SYNC|int}]  
  [, {STATECHANGE | SC}={SAVE|STOP|IGNORE}]
```

## Miscellaneous and optional keywords

**SMFINTVAL** default is 15 (1-60) or **SYN**chronise with global SMF interval  
**STAECHANGE** control action if CPU status changes (default SAVE)

```
F hisproc,{END | E}
```

**END** the HIS data collection process

**HIS control is simple with delineation for system & load module data**

# CPU MF: SAMPLING Rates & Related CPU Overhead

<b>Suggested Sampling Rates &amp; CPU Overhead - Subset of z10 Servers</b>					
<b>CPU Model ID</b>	<b>Sampling Rate/Minute</b>	<b>Max %CPU Overhead</b>	<b>CPU Model ID</b>	<b>Sampling Rate/Minute</b>	<b>Max %CPU Overhead</b>
2097-701	800,000	~1.0-2.0	2098-O01	165,000	~0.2-0.4
2097-601	550,000	~0.5-1.0	2098-N01	145,000	~0.2-0.4
2097-501	405,000	~0.5-1.0	2098-M01	130,000	~0.1-0.2
2097-401	190,000	~0.25-0.5	2098-L01	110,000	~0.1-0.2
2098-Z01	580,000	~0.75-1.5	2098-K01	100,000	~0.1-0.2
2098-Y01	530,000	~0.75-1.5	2098-J01	85,000	~0.1-0.2
2098-X01	470,000	~0.66-1.3	2098-I01	80,000	~0.1-0.2
2098-W01	420,000	~0.5-1.0	2098-H01	70,000	<0.1
2098-V01	370,000	~0.5-1.0	2098-G01	65,000	<0.1
2098-U01	330,000	~0.5-1.0	2098-F01	50,000	<0.1
2098-T01	290,000	~0.3-0.6	2098-E01	50,000	<0.1
2098-S01	265,000	~0.3-0.6	2098-D01	40,000	<0.1
2098-R01	230,000	~0.3-0.6	2098-C01	35,000	<0.1
2098-Q01	210,000	~0.25-0.5	2098-B01	30,000	<0.1
2098-P01	190,000	~0.25-0.5	2098-A01	20,000	<0.1
A lower sampling rate reduces CPU overhead proportionally					
As the number of LPAR logical CPUs increases, the overhead (% total capacity) decreases					
For counters (SMF) data, CPU overhead cost is so small, it's immeasurable. Therefore it's recommended to turn on the collection of counters data in all LPs on a permanent basis.					
<b>Bottom Line: ~1/100 of a CPU second for HIS address space in a 15 Minute SMF interval!</b>					

**Arguably Application diagnostic CPU usage concerns are eradicated!**

# **CPU MF: Partial HIS COUNTERS Report Example**

```
HIS019I EVENT COUNTERS INFORMATION VERSION 1
FILE NAME: SYSHIS20100221.121354.CNT
COMMAND: MODIFY HIS,B,CTRONLY
COUNTER VERSION NUMBER 1: 1   COUNTER VERSION NUMBER 2: 1
```

```
COUNTER SET= BASIC
COUNTER IDENTIFIERS:
  0: CYCLE COUNT
  1: INSTRUCTION COUNT
  2: L1 I-CACHE DIRECTORY-WRITE COUNT
  3: L1 I-CACHE PENALTY CYCLE COUNT
  4: L1 D-CACHE DIRECTORY-WRITE COUNT
  5: L1 D-CACHE PENALTY CYCLE COUNT
```

```
START TIME: 2010/02/21 12:13:54   START TOD: C592FB9B1DB68F92
END TIME:   2010/02/21 12:20:49   END TOD:   C592FD26A2CA7092
COUNTER VALUES (HEXADECIMAL) FOR CPU 00 (CPU SPEED = 4404 CYCLES/MIC):
  0-  3 00000006663C2773 000000013562F9B1 00000000020BFA21 00000000769FBCC0
  4-  7 0000000003D2CA56 000000026DA59633 -----
```

*The files that HIS uses for COUNTERS data have the SYSHISyyyyymmdd.hhmmss.CNT naming convention. Each of the separate HIS file types has a unique low level qualifier. The CNT file type is always used for counters files. This file contains the delta values for the entire collection period. It also contains the counts for all online PUs. For sampling data, HIS creates one file for each active logical CPU in the system as per SYSHISyyyyymmdd.hhmmss.SMP.cpu#.*

***Basic information at first glance, but there is precious gold, if you dig...***



## ***CPU MF: Partial Extract From Samples (MAP) File***

```
I SYS #@$2
I SMFI#@$2
I OS z/OS
I FMIDHBB7760
I DATE10053
I TIME23392786
I MAP V1R1
I LPID00000011
I MACH00002097
B BDY PRIVATE 0000000007FFFFFF
B BDY CSA      0080000000C63FFF
B BDY CSAALLOC0004C14802EEB328
B BDY CSACONVT0000000000000000
B BDY MLPA     00C6400000C64FFF
B BDY FLPA     0000000000000000
B BDY PLPA     00C6500000E35FFF
B BDY SQA      00E3600000FD5FFF
B BDY SQAALLOC000E9DA801706878
B BDY RWNUC    00FD600000FE386F
B BDY RON      00FE400000FFFFFF
B BDY ERON     010000000199945F
```

If you request the collection of map information, HIS creates a human-readable file containing the start and end address of every program in the MVS common area. This file contains the start and end address of every program in the private area of every swapped-in address space, depending on which options you specify. The file also contains information about the system that HIS was run on and a storage map showing the various parts of virtual storage.

The virtual storage can be in the Common Service Area (CSA), Extended Common Service Area (ECSA), Nucleus, and so on. HIS uses the following naming convention for these files:

`SYSHISyyyymmdd.hhmmss.MAP`

The first part of the file name follows the same convention as the counters and sampling files.

The low level qualifier is MAP. HIS only creates one file, regardless of the number of logical CPUs in the LPAR, or the number of address spaces that were requested on the MAPASID keyword.

***Still basic information initially, but ADATA/CSECT mapping is evident***

# CPU MF: SMF 113 Impact & Potential In One Slide!

An SMF 113 record is 452 bytes in size for each LP per SMF interval. The example below is for 3 z196 CPC's, 10 LPAR's and SMF recording for 5 \* 24 hour days. SMF 113 data size is ~1% when compared with Type 70/72!

RECORD TYPE	RECORDS READ	PERCENT OF TOTAL	AVG. RECORD LENGTH	MIN. RECORD LENGTH	MAX. RECORD LENGTH	RECORDS WRITTEN	Total Size (with AVG. Record Size)	% Total Size (with AVG. Record Size)
70	14,250	1.8%	14,236	640	32,736	14,250	202,865,850	15.1%
72	744,014	93.5%	1,516	1,104	20,316	744,014	1,128,252,590	83.7%
113	37,098	4.7%	452	452	452	37,098	16,768,296	1.2%
TOTAL	795,362	100.0%	1,695	18	32,736	795,362	1,347,886,736	100.0%

Compare zSeries Server evolution, incorporate new CPU MF data into zPCR/LSPR Capacity Planning disciplines

	CPI	Prb State	Est Instr Cmplx CPI	Est Finite CPI	Est SCPL1M	L1MP	L15P / L2P	L3P	L2LP / L4LP	L2RP / L4RP	MEMP	Rel Nest Intensity	LPARCPU
z10	5.50	22.7	2.98	2.52	68	3.6	74.9	0.0	20.1	0.4	4.5	0.55	467.1
z196 / z114	4.96	35.5	2.55	2.41	63	3.8	60.8	23.8	11.3	0.7	3.4	0.77	425.4

CPI : Cycles per Instruction Prb State : % Problem State Est Instr Cmplx CPI: Estimated Instruction Complexity CPI (infinite L1)  
 Est Finite CPI : Estimated CPI from Finite cache/memory Est SCPL1M : Estimated Sourcing Cycles per Level 1 Miss  
 L1MP: Level 1 Miss Per 100 instructions L15P: % sourced from L1.5 cache L2P: sourced from Level 2 cache  
 L2LP: sourced from Level 2 Local cache (on same book) L2RP: sourced from Level 2 Remote cache (on different book)  
 L3P: sourced from Level 3 on same Chip cache (New resource for z196/z114) L4LP: sourced from Level 4 Local cache (on same book)  
 L4RP: sourced from Level 4 Remote cache (on different book) MEMP: % sourced from Memory  
 Rel Nest Intensity: distribution and latency from shared caches and memory LPARCPU - APPL% (GCPs, zAAPs, zIIPs) (un)captured

**Activate CPU MF Counters, collect SMF 113 records, model workloads!**



# CPU MF: IBM Report Generator - HIS Sampling Data

```
== > vi -R SYSHIS20100812.181049.000.Report
HIS Report 1.0.0 - 20101110
*** ^B4 Copyright IBM Corp. 2010 ***

Report for all Home ASIDs
  SAMPLES  ISAMPLES    CPU %    CPI  PASN  JOBNAME  MODULE  CSECT
  =====  =====  =====  =====  =====  =====  =====  =====
  541851    207906    28.694    2.61  003A  BBOS002S <NoModule> <NoCSECT>
  137513    13424     7.282   10.24  0000  <COMMON> <NoModule> <NoCSECT>
  133847    50849     7.088    2.63  0051  BBOS001S <NoModule> <NoCSECT>
   53355    14224     2.825    3.75  003A  BBOS002S libj9gc24.so <NoCSECT>
   35627     4052     1.887    8.79  004E  DBTDDBM1 DSNXGRDS  DSNXECP
   31207     4711     1.653    6.62  004E  DBTDDBM1 DSNXGRDS  DSNXERD
   27760     8295     1.470    3.35  004E  DBTDDBM1 DSNXGRDS  DSNXROHB
   25878     6642     1.370    3.90  004E  DBTDDBM1 DSNXGRDS  DSNXERT
   24286     4883     1.286    4.97  0000  <COMMON> DSNWVSR1  DSNWVSR1
   23644     2684     1.252    8.81  004E  DBTDDBM1 DSNIDM    DSNIOST2
   20639         219     1.093   94.24  003A  BBOS002S DSNARRS  <NoCSECT>
   20437    10476     1.082    1.95  004E  DBTDDBM1 DSNIDM    DSNIONX2
   19907     4346     1.054    4.58  003A  BBOS002S DSNAQ6L2  DSNAQ6C5
   19109     3952     1.012    4.84  003A  BBOS002S libj9vm24.so <NoCSECT>
   17862     3175     0.946    5.63  004E  DBTDDBM1 DSNBBM    DSNB1GET
```

IBM provides an insight into what potential is available with CPU MF (HIS) sampling data (load module) for a "CPU usage hot spot summary" @ [www-03.ibm.com/systems/z/os/zos/features/unix/tools/hisreport.html](http://www-03.ibm.com/systems/z/os/zos/features/unix/tools/hisreport.html) ...

**CPU MF, lots of data, little usable information! Is there a better way?**

# CPU MF Deployment: No Brainer Recommendations



**Technical Support**

**Recommendation:** Turn on HIS COUNTERS facility to generate CPU MF SMF 113 records for all LPARs on all z10, z196/z114 & zEC12 servers. Incorporate this data into zPCR activities, and learn how LSPR categories are evolving based on meaningful workload categories (Relative Nest Intensity – RNI). Therefore CPU MF (SMF 113) data can assist you in identifying why workload performance might have changed. Consider producing a CPU hot spot analysis using HIS SAMPLES data, collaborating with Application Support.



**Application Support**

**Recommendation:** Collaborate with Technical Support and consider introducing or enhancing Application Performance Tuning within the Development lifecycle (I.E. Prepare/Execute Performance/Stress/Failover Test), before Production implementation, based upon meaningful and real-life data from your installation, namely CPU MF SAMPLING data. Identify a methodology for highlighting the module/csect that is producing the high CPU usage, from the CPU MF SAMPLING data, either writing your own reports, or using a software tool. Therefore tuning your code before Production roll-out.



**Operations**

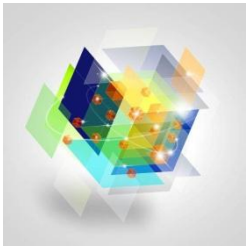
**Recommendation:** Regardless of who “owns” the Application Performance Tuning process, Operations staff are not robots, but they are at the sharp end of customer support, and they experience the System and related Applications, day in and day out. Both the Technical and Application Support teams should consider a “back to the floor” activity, spending a day and night shift with Operations, for a normal and peak day, learning accordingly. Worst case, maybe a new team member might be identified!

**If CPU MF is available, it's zero cost, deploy the function & find benefit!**

# ***zHISR Introduction: Application CPU Hot Spot Analysis***



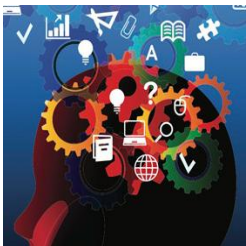
*zHISR uses data created by CPU MF & z/OS Hardware Instrumentation Services (HIS) on IBM System z10 & zEnterprise mainframe processors to produce CPU hotspot analysis reports, which can be used to help tune applications by locating the specific sections of code that are the biggest CPU consumers.*



*zHISR includes a z/OS UNIX file system interface for navigating, browsing & deleting files, including HIS collection files. Programmers can start or stop a HIS data collection event or view the status of a current or prior run. If zIIP specialty engines are available, nearly all zHISR CPU processing is redirected to a zIIP.*



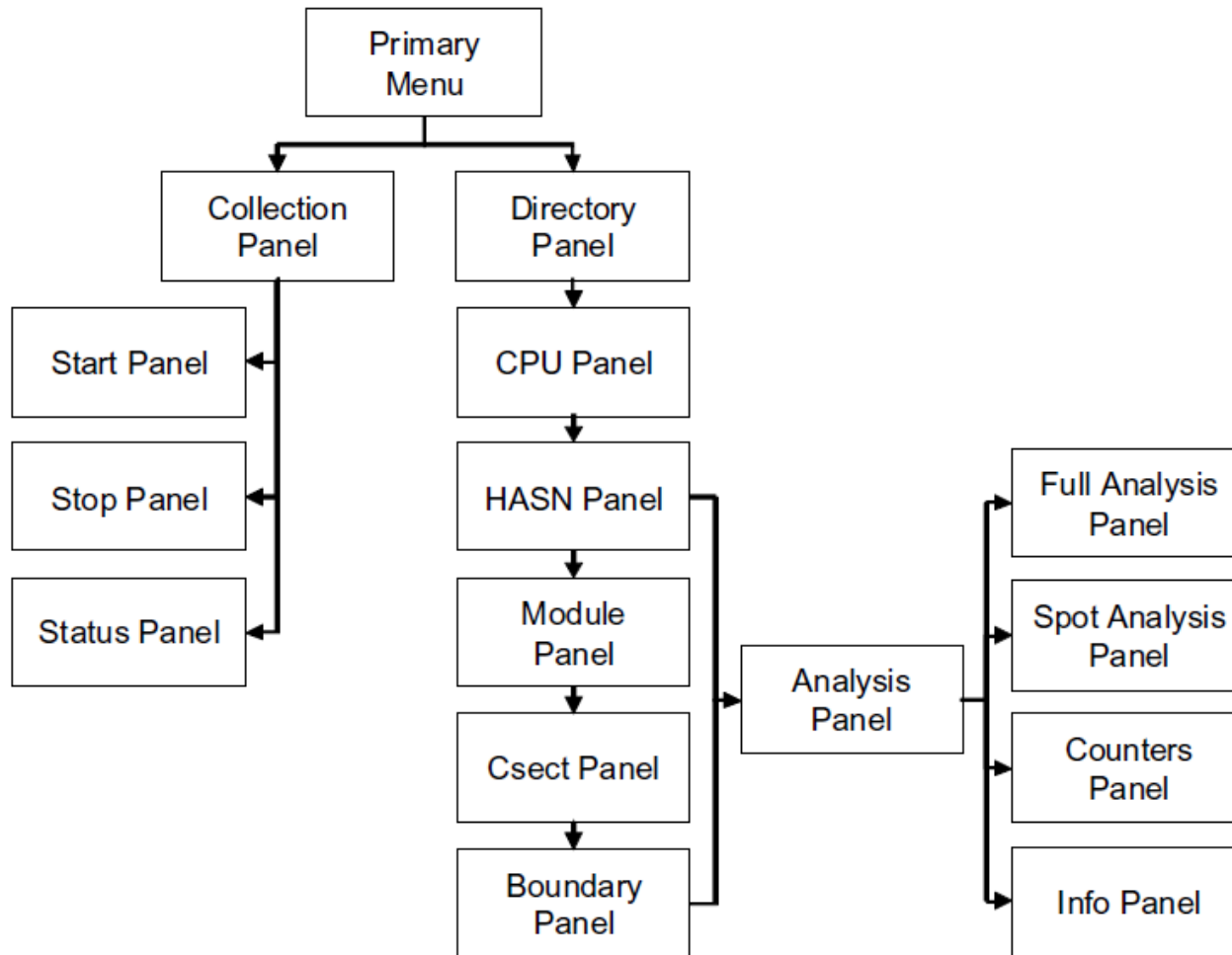
*For ease of use, zHISR includes a familiar fully CUA compliant ISPF interface, allowing System Programmers, Application Developers & others to manage an Application CPU Hot Spot analysis from start to end, with an intuitive and logical flow, for managing the raw HIS data & subsequent formatted screens & reports.*



*From a reporting viewpoint, zHISR performs an intelligent data reduction analysis for the raw HIS data files, producing intelligent and easy-to-follow information reports, in both detailed and summary format, allowing “Office” type reporting (E.g. PC) for Managers, Technicians & Business Users alike.*

***zHISR, an easy-to-use, low resource & cost optimized productivity tool!***

# *zHISR Working Overview: ISPF Panel Hierarchy*



*The zHISR system allows you to control the HIS collection, manage event collection data files, perform data reduction & analysis activities, identify high CPU users & associated source code.*

## *zHISR Working Overview: Primary ISPF Panel*

```
04/06/2011          zHISR: P r i m a r y   M e n u          (V1R0) 13:25:04

Directory /u/his
_____
_____

Lrecl  FileName
-----
_ 99    /u/his/SYSHIS20081210.113303.MAP
_ 64    /u/his/SYSHIS20081210.113303.SMP .00

1=Help  2=HIS  3=End  7=Bwd  8=Fwd  B=Browse  C=Cancel
```

*The zHISR Primary Menu has a Directory field for entering a UNIX file system path (/his is typically the installation default) as well as presenting list of files you are currently working with.*

# zHISR Working Overview: UNIX File System Dialog

```
04/06/2011          zHISR: UNIX File System Directory Display          12:03:11
                    1=Help 2=Refresh 3=End 4=Return 7=Bwd 8=Fwd
Directory /u/his

Type  Permission Owner   Group  FileName
---  -
Dir   drwxr-xr-x HIS    DEV    .
Dir   dr-xr-xr-x SYSOPER TTY    ..
File  -rwxr-xr-x HIS    SYS1   SYSHIS20081210.113303.CNT
BL   3303.MAP
     3303.SMP.00
     3303.SMP.01
     3303.SMP.02
     4324.CNT
     4324.SMP.00
File  -rwxr-xr-x HIS    SYS1   SYSHIS20090205.194324.SMP.01
File  -rwxr-xr-x HIS    SYS1   SYSHIS20090205.194324.SMP.02
File  -rwxr-xr-x HIS    SYS1   SYSHIS20090205.194324.SMP.03
File  -rwxr-xr-x HIS    SYS1   SYSHIS20090214.100114.CNT
File  -rwxr-xr-x HIS    SYS1   SYSHIS20090214.100114.MAP
File  -rwxr-xr-x HIS    SYS1   SYSHIS20090214.100114.SMP.00
File  -rwxr-xr-x HIS    SYS1   SYSHIS20090214.100114.SMP.01

0001 of 0008  A{n}=Analyze B{L}=Browse RM=Remove S=Slct Cursor=Slct  XXXX FB
```

The zHISR UNIX File System Directly Display lists the HIS data collection event (MAP, CNT, SMP) files. Use the **B** or **BL** command to browse a HIS event file. **BL** prompts for logical record length.

## *zHISR Working Overview: HIS Event File Browse Mode*

```
04/06/2011 UNIX-2049-PVT  BROWSE MODE /u/his/SYSHIS20081210.113303.MAP 12:05:02
NUNDO NNUM NCAPS NNULLS NTAB NCOLS CFIND NXMSG NCBL CS FWD NXC NFIND
      1---+---10----+---20----+---30----+---40----+---50----+---60----+---70--
000010 I SYS MVSAA0
000020 I SMFIMVA0
000030 I OS  z/OS
000040 I FMIDHBB7740
000050 I DATE08345
000060 I TIME11340442
000070 I MAP V1R1
000080 I LPID00000004
000090 I MACH00002098
000100 B BDY PRIVATE 0000000000AFFFFF
000110 B BDY CSA      00B0000000D42FFF
000120 B BDY CSAALL0C0004A57801CBFB30
000130 B BDY CSACONVT0000000000000000
000140 B BDY MLPA   0000000000000000
000150 B BDY FLPA   0000000000000000
000160 B BDY PLPA   00D4300000F0AFFF
000170 B BDY SQA    00F0B00000FD6FFF
000180 B BDY SQAALL0C000369A800F15648
      Edit queue restart has been performed.
      1---+---10----+---20----+---30----+---40----+---50----+---60----+---70--
```

*The Browse Mode dialog opens the HIS Event File in human readable format, displaying the header information, allowing the user an opportunity to confirm their HIS file creation/selection.*

# zHISR Working Overview: HIS Data Collection Control

```
04/06/2011          zHISR: Manage H.I.S. Event Data Collection          13:48:34

System MVS70      Proc HIS      Title HIS RUN FOR BOB
BufCnt 256      Duration 10      SampFreq 325000      DataLoss IGNORE
CtrSet ALL
MapAsid _____
MapJob  _____
Path /u/his
Command File Dsname BOB.CLIST

1=Help  2=View  3=End  4=Start  5=Stop  6=Clear  7=Status
```

The Event Data Collection dialog allows the user to control (start, stop, specify parameters) their HIS data collection activity. Pressing PF2 from the Primary Menu invokes the HIS Collection Panel.



# zHISR Working Overview: Event Data Analysis - Start

```
05/12/2011          zHISR: UNIX File System Directory Display          13:21:04
                    1=Help 2=Refresh 3=End 4=Return 7=Bwd 8=Fwd
Directory /u/his

  Type  Permission  Owner   Group   FileName
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     SYS1    SYSHIS20110130.203656.000.MAP
  a File  -rwxr-xr-x  HIS     SYS1    SYSHIS20110130.203656.000.SMP.00
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     SYS1    SYSHIS20110130.203656.000.SMP.01
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     SYS1    SYSHIS20110130.203656.000.SMP.02
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     SYS1    SYSHIS20110130.203656.000.SMP.03
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110426.195849.000.CNT
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110504.133115.000.CNT
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110504.133115.000.MAP
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110504.133115.000.SMP.00
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110504.133115.000.SMP.01
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110504.133115.000.SMP.02
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110504.133115.000.SMP.03
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110504.204458.000.CNT
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110504.204458.000.SMP.00
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110504.204458.000.SMP.01
  ___   _____  _____  _____  _____
  File  -rwxr-xr-x  HIS     DEV     SYSHIS20110504.204458.000.SMP.02

0003 of 0009  A{n}=Analyze B{L}=Browse RM=Remove S=Slct Cursor=Slct  XXXX FB
```

The user can Analyze a data collection run by typing an **A** in the command column. zHISR then invokes an intuitive dialog via a series of ISPF panels to limit & refine the scope of your analysis.

# zHISR Working Overview: Event Data Analysis - CPU

```
05/12/2011          zHISR: H.I.S. Sample Data CPU Selection          13:21:37
CPU Report          SYSHIS20110130.203656.000          Sort: Cpu#

Check the box next to each sample file name that is to be included
in the analysis. Uncheck the box if the file is not to be included
in the analysis. Once you have completed your selections press PF5
to continue.

X SYSHIS20110130.203656.000.SMP.00    156.00K
X SYSHIS20110130.203656.000.SMP.01     0.00K
X SYSHIS20110130.203656.000.SMP.02    72.00K
X SYSHIS20110130.203656.000.SMP.03  1096.00K

0001 of 0001          1=Help  3=End  5=Next  7=Bwd  8=Fwd          XXXX FB
```

The CPU panel lets you select (X) 1 or more CPUs for analysis. The last 2 digits of the displayed file name represent the CPU number in hexadecimal. Press PF5 to continue to the next screen.

# zHISR Working Overview: Event Data Analysis - HASN

```
05/12/2011          zHISR: H.I.S. Sample Data HASN Selection          13:22:25
ASID Report        SYSHIS20110130.203656.000          Sort: Percent

Move the cursor to the ASID of the address space to be excluded
or included in the analysis and press Enter.  Only one ASID may
be selected.  Once you have completed your selection press PF5.

- 83.999% 0031-C4CONDOR      3.145% 0036      1.788% 000B
  1.164% 0024      0.947% 013C      0.626% 0040
  0.541% 0025      0.497% 004A      0.449% 013D
  0.411% 0006      0.408% 0020      0.406% 000F
  0.275% 012A      0.270% 0035      0.208% 0001
  0.179% 0012      0.169% 0137      0.159% 001E
  0.154% 0038      0.118% 004B      0.096% 0007
  0.096% 0033      0.089% 0015      0.080% 000A
  0.063% 0014      0.053% 0034      0.043% 0028
  0.043% 0044      0.041% 0009      0.034% 0008
  0.034% 00C3      0.029% 001D      0.029% 0046
  0.024% 0017      0.024% 0022      0.017% 0131
  0.014% 002F      0.012% 0051      0.009% 000C
  0.009% 001B      0.009% 0042      0.007% 0037
  0.007% 0039      0.007% 0134      0.005% 001F

0001 of 0002    1=Help 2=Anal 3=End 5=Next 7=Bwd 8=Fwd 9=Sort_ASID    XXXX FB
```

Use the HASN Panel to select the Home Address Space ID of the address space that is the target for analysis. From here, you can select (PF5) the ASID for Analysis, & perform the Analysis (PF2).

# zHISR Working Overview: Event Data Analysis - Module

```
05/12/2011          zHISR: H.I.S. Sample Data Module Selection      13:27:22
Module Report       SYSHIS20110130.203656.000                      Sort: Owner

Move the cursor to a module to be excluded or included in the
analysis and press Enter. Continue this process as often as
needed. Once you have completed your selections press PF5.

_ 0031-$$LOGON  00000000_00011840 00000000_00011CBF C4CONDOR
0031-BPXWREXX 00000000_0CF78000 00000000_0CF95E17 C4CONDOR
0031-CALL     00000000_0D97B000 00000000_0D9B3FFF C4CONDOR
0031-CALL1    00000000_0DA0C000 00000000_0DA31FFF C4CONDOR
0031-CALL2    00000000_0D8CB000 00000000_0D8E5FFF C4CONDOR
0031-CALL3    00000000_0D8BA000 00000000_0D8C3FFF C4CONDOR
0031-CALL4    00000000_0DA32000 00000000_0DA41FFF C4CONDOR
0031-CALL5    00000000_0DA67000 00000000_0DA89FFF C4CONDOR
0031-CALL6    00000000_0DABA000 00000000_0DAA1FFF C4CONDOR
0031-CAMLIOCS 00000000_0D2DB000 00000000_0D2DFFFF C4CONDOR
0031-CONDOR   00000000_0D8B1000 00000000_0D8B13C7 C4CONDOR
0031-CYGIFRT  00000000_0DCC0000 00000000_0DCC03FF C4CONDOR
0031-CYGINIT  00000000_000B0000 00000000_000B5FFF C4CONDOR
0031-CYGLOGIC 00000000_0D32B000 00000000_0D35DFFF C4CONDOR
0031-CYGPXNX  00000000_0DCDE000 00000000_0DCE2FFF C4CONDOR

0001 of 0100  1=Help 2=Mask 3=End 5=Next 7=Bwd 8=Fwd 9=Sort_Address  XXXX FB
```

The zHISR Module Panel, allows you to choose the choose the modules for Analysis. A generic masking ability allows you to include or exclude multiple modules.

# zHISR Working Overview: Event Data Analysis - Csect

```
05/12/2011          zHISR: H.I.S. Sample Data Csect Selection          13:27:52
Csect Report        SYSHIS20110130.203656.000                          Sort: Owner

Move the cursor to a Csect to be excluded or included in the
analysis and press Enter. Continue this process as often as
needed. Once you have completed your selections press PF5.

_ 0031-$$LOGON  00000000_00011840 00000000_00011CBF
 0031-@@KJUMP  00000000_0CF7A958 00000000_0CF7AA07
 0031-@@TRT    00000000_0CF7CB30 00000000_0CF7CC2F
 0031-@@XTQVFM 00000000_0CF7CF00 00000000_0CF7D11F
 0031-ACCESS   00000000_0CF6D000 00000000_0CF6D486
 0031-ALLOC    00000000_0CF50000 00000000_0CF5128D
 0031-ALTER    00000000_0CF52000 00000000_0CF52A4D
 0031-ATTRIB   00000000_0CF4A000 00000000_0CF4B4FF
 0031-BPXWESTA 00000000_0CF7D1A0 00000000_0CF7D22B
 0031-BPXWREXX 00000000_0CF7D230 00000000_0CF95913
 0031-BPXWRFM  00000000_0CF95AC0 00000000_0CF95B6D
 0031-BPXWRFMS 00000000_0CF95B70 00000000_0CF95C2B
 0031-BPXWRGM  00000000_0CF95A08 00000000_0CF95ABB
 0031-BPXWRTIM 00000000_0CF95C30 00000000_0CF95D2B
 0031-BPXWRT2E 00000000_0CF95D30 00000000_0CF95E13

0001 of 1537  1=Help 2=Mask 3=End 5=Next 7=Bwd 8=Fwd 9=Sort_Address  XXXX FB
```

The zHISR Csect Panel, allows you to choose the choose the module Csect(s) for Analysis. Once again, a generic masking ability allows you to include or exclude multiple module Csects.

# zHISR Working Overview: Event Data Analysis - Boundary

```
05/12/2011          zHISR: H.I.S. Sample Data Bndry Selection          13:28:18
Boundary List       SYSHIS20110130.203656.000                          Sort: Owner

Move the cursor to a boundary to be excluded or included in
the analysis and press Enter. Continue this process as often
as needed. Once you have completed your selections pres PF5.

- CSA          00000000_00B00000  00000000_00D2FFFF
CSAALLOC      00000000_000413D8  00000000_0246CEF8
DONUC         00000000_3F3E1000  00000000_3F3E4FFF
ECSA          00000000_07E52000  00000000_0CEFFFFFFF
EFLPA         00000000_07E41000  00000000_07E43FFF
EMLPA         00000000_07E44000  00000000_07E51FFF
EPLPA         00000000_03AD1000  00000000_07E40FFF
EPRV          00000000_0CF00000  00000000_7FFFFFFF
ERON          00000000_01000000  00000000_01A050AF
ERWN          00000000_01A06000  00000000_01A6BFFF
ESQA          00000000_01A6C000  00000000_03AD0FFF
PLPA          00000000_00D30000  00000000_00F07FFF
PRIVATE       00000000_00000000  00000000_00AFFFFFFF
RON           00000000_00FE4000  00000000_00FFFFFFF
RWNUC         00000000_00FD5000  00000000_00FE3B17

0001 of 0002    1=Help 2=Mask 3=End 5=Next 7=Bwd 8=Fwd 9=Sort_Address  XXXX FB
```

The zHISR Boundary Panel, allows you to choose the choose which working storage areas should be included. A generic masking ability allows you to include or exclude multiple selections.

# zHISR Working Overview: Event Data Analysis - Full

```
05/12/2011          zHISR: H.I.S. Full Analysis          13:23:28
Run Summary        SYSHIS20110130.203656.000      Sort: Tot_Pct
```

PSW_Address	Tot_Pct	Sel_Pct	Csect	Module	Boundary
00000000_0DD1A340	34.011%	40.490%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD4A040	15.558%	18.522%	EJESFT3	EJESFT3	EPRV
00000000_0DD49DC0	7.806%	9.293%	EJESFT3	EJESFT3	EPRV
00000000_0DD1A500	2.684%	3.195%	EJESSUB3	EJESSUB3	EPRV
00000000_0D2BB4C0	2.450%	2.916%	GAOLPI0G	GAOLPI0G	EPRV
00000000_0DD1A300	1.718%	2.045%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD1AAC0	1.155%	1.375%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD1A1C0	1.094%	1.303%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD1A400	0.959%	1.142%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD1A2C0	0.930%	1.107%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD1AB80	0.850%	1.012%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD4A1C0	0.802%	0.955%	EJESFT3	EJESFT3	EPRV
00000000_0DD440C0	0.785%	0.935%	EJESFT3	EJESFT3	EPRV
00000000_0DD1A4C0	0.773%	0.920%	EJESSUB3	EJESSUB3	EPRV
00000000_0D2D8D00	0.751%	0.894%	GAQID	GAQID	EPRV
00000000_0DD4A700	0.645%	0.768%	EJESFT3	EJESFT3	EPRV
00000000_0DD49E00	0.594%	0.707%	EJESFT3	EJESFT3	EPRV

```
0001 of 0039  1=Help 3=End 7=Bwd 8=Fwd 9=Sort_Sel_Pct 10=Mem 12=Print  XXXX FB
```

The Full Analysis Panel displays the selected data, sorted by percentage of total (CPU) entries (sort by any column). Place your cursor on an entry; press *Enter* & invoke the Spot Analysis Panel.

# zHISR Working Overview: Event Data Analysis - Spot

```

05/12/2011          zHISR: H.I.S. Spot Analysis          13:24:01
By Csect            SYSHIS20110130.203656.000          Sort: Address
  
```

Psw_Address	Offset	Tot_Pct	Sel_Pct	Csect	Module	Boundary
00000000_0DD0F0C0	000000C0	0.005%	0.006%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD0F100	00000100	0.009%	0.011%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD0F140	00000140	0.024%	0.029%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD0F2C0	000002C0	0.002%	0.003%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD0F300	00000300	0.002%	0.003%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD0F340	00000340	0.007%	0.008%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD0F380	00000380	0.005%	0.006%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD0F4C0	000004C0	0.012%	0.014%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD0F500	00000500	0.002%	0.003%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD0F700	00000700	0.002%	0.003%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD0F9C0	000009C0	0.002%	0.003%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD10B00	00001B00	0.002%	0.003%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD10FC0	00001FC0	0.121%	0.144%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD11040	00002040	0.067%	0.080%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD11080	00002080	0.002%	0.003%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD114C0	000024C0	0.002%	0.003%	EJESSUB3	EJESSUB3	EPRV
00000000_0DD13200	00004200	0.002%	0.003%	EJESSUB3	EJESSUB3	EPRV

```

0001 of 0004  1=Help 3=End 7=Bwd 8=Fwd 9=Sort_Tot_Pct 10=Mem 12=Print  XXXX FB
  
```

The Spot Analysis Panel is a detailed display of the Load Module activity, sorted by PSW Address (sort by any column). The Tot\_Pct column will highlight the highest CPU usage resource (offset).



# *zHISR Working Overview: Event Data Analysis - ADATA*

```
05/12/2011                zHISR: Associated Data Prompt                13:24:37
                          SYSHIS20110130.203656.000

For Assembly enter the SYSADATA dataset name, for Cobol enter the SYSPRINT
dataset name, correct the member name if necessary and then press the PF2
key to view the associated data.

Input dataset name  BOB1.ADATA
Target member name  ODE
Report page limit   1000
Instruction address  00000000_0DD10B00
Instruction offset   00001B00

1=Help  2=Adata  3=End  6=Clear
```

*By cross-referencing the high CPU user from the spot analysis (Instruction address/offset) with the load module Associated Data (ADATA), the user will be then able to display the source code.*

## *zHISR Working Overview: Event Data Analysis - Code*

```
05/12/2011          zHISR: A s s o c i a t e d   D a t a          13:25:35
                   SYSHIS20110130.203656.000                   More➔

                   THRU ODE2200-PROG-OPN-CTL-EXIT .           062500 (000625)
                                                           062600 (000626)
001AE8             PERFORM ODE2200-PROG-PROCESS-WORK           062700 (000627)
                   THRU ODE2200-PROG-PROCESS-WORK-EXIT       062800 (000628)
                   UNTIL ARE-THERE-MORE-RECORDS = 'NO ' .     062900 (000629)
                                                           063000 (000630)
001B1A             PERFORM ODE2200-TERM-PROGRAM               063100 (000631)
                   THRU ODE2200-TERM-PROGRAM-EXIT .           063200 (000632)
                                                           063300 (000633)
001B3E             ODE000-GET-DATE .                            063400 (000634)
                                                           063500 (000635)
001B42             ACCEPT THE-RUN-DATE FROM DATE .            063600 (000636)
001B84             ACCEPT THE-RUN-TIME FROM TIME .             063700 (000637)
001BC6             IF RUN-YEAR LESS THAN 69                    063800 (000638)
001BE0             MOVE '20' TO CENT-OUT .                     063900 (000639)
001BF2             MOVE RUN-MONTH TO MNTH-OUT .                064000 (000640)
001C00             MOVE RUN-DAY   TO DAY-OUT .                 064100 (000641)
001C0E             MOVE RUN-YEAR  TO YEAR-OUT .                 064200 (000642)
001C1C             MOVE RUN-HOUR  TO HOUR-OUT .                 064300 (000643)

0034 of 0070  1=Help 3=End 4=Return 7=Bwd 8=Fwd 10=Lft 11=Rht 12=Print XXXX FB
```

*Pressing PF2 from the ADATA panel invokes the Associated Data Panel. This panel consists of multiple pages of program text & offset (highlighted) information for the selected Csect/Module.*

# zHISR Working Overview: Event Data Analysis - Reports

```
07/06/2011          zHISR: Print/Save/Export - Spot Analysis          12:12:41
                    SYSHIS20110130.203656.000

To print the current report provide a valid SYSOUT class and press the PF4
key. To save the current report supply the name of a PDS or PDSE dataset
that you are authorized to update and the member name that is to contain the
report and press the PF5 key. To export the current report as a CSV file
specify the output path name and press the PF7 key.

Sysout Class  _

Output Dataset Name _____
Output Member Name  _____

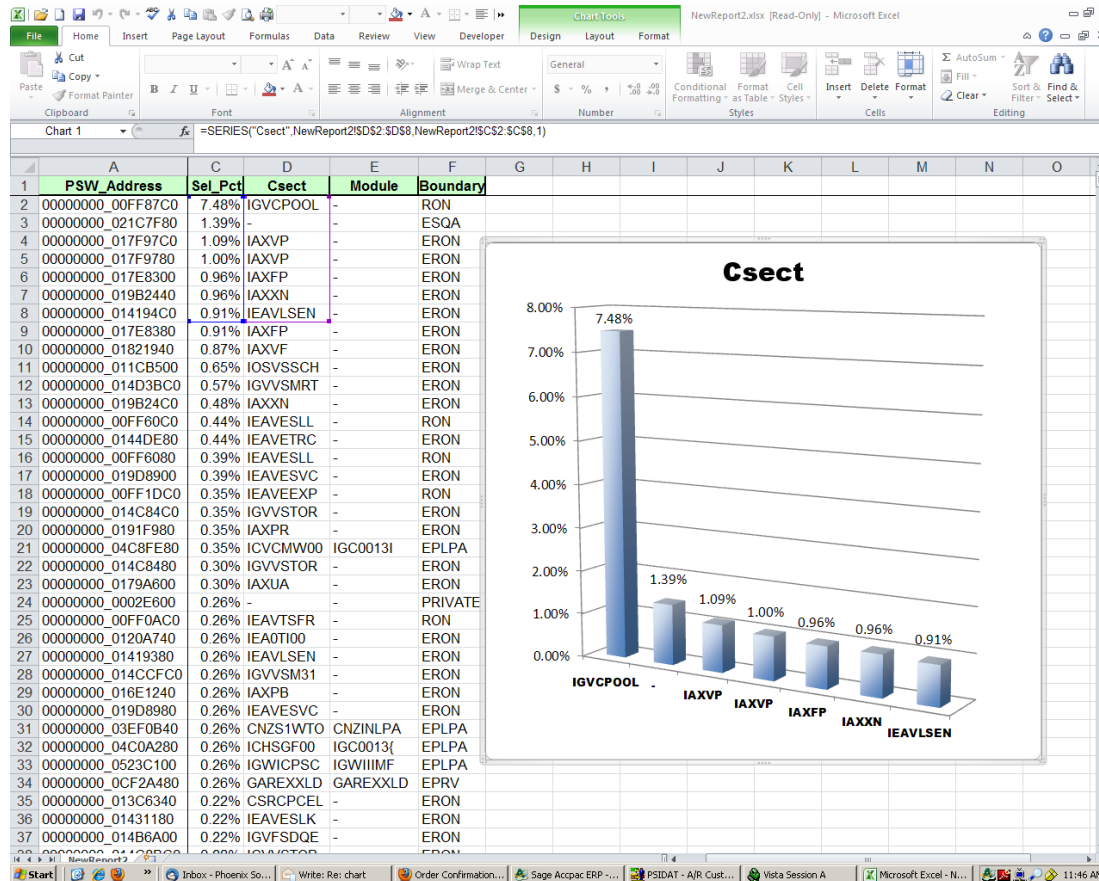
Output Path Name  _____

Character encoding ASCII

1=Help  3=End  4=Print  5=Save  6=Clear  7=Export
```

*The user can print or save a Full Analysis, Spot Analysis or Associated Data report by pressing PF12 from any of those panels. The user can also export Full & Spot Analysis reports to a CSV file.*

# zHISR Working Overview: Event Data Analysis - CSV



If the user exports their analysis results a CSV file, they can import that file into a spreadsheet (E.g. Excel) or any program supporting CSV formats to graphically analyze & visualize their data.

# zHISR Working Overview: Event Data Analysis - Help

```
04/06/2011 Tutorial zHISR: Help Tutorial GAHI0000 12:01:00
-----
Move the cursor to your selection and press the Enter key
      (Or Point-and-Shoot)
Press PF3 to Return to Invoker or PF12 to End Help

      Basic zHISR Functions
      -----
      - Start a data collection event
      - Stop a data collection event
      - Display HIS status
      - Navigate the UNIX File System
      - Remove files from the UNIX File System
      - Browse a UNIX file
      - Cancel a browsed UNIX file
      - Analyze a completed data collection run

zHISR may be used to generate a hot spot analysis of customer,
vendor or operating system program execution. zHISR uses data
that is created by z/OS Hardware Instrumentation Services that

0001 of 0008          3=End 7=Bwd 8=Fwd 12=Return          XXXX FB
```

*As per any CUA compliant software product, zHISR has an inbuilt extensive online Help Tutorial with step-by-step, detailed instructions for using zHISR, allowing easy use without RTM activities.*

# Application Performance: CPU MF-zHISR Benefits Summary



**Technical Support**

**Benefit:** CPU MF (SMF 113) provides zSeries Server sizing information not previously available & should be used for Capacity Planning & System Sizing activities. The major ethos change is LSPR/zPCR sizing based on customer workload data, not “simulation” profiles. z10 GA was October 2008, and z10 is now an n-2 (I.E. z196/z114, zEC12) server, so in all likelihood, most committed Mainframe customers will deploy a CPU MF eligible server. The cost of activating CPU MF for SMF 113 records is arguably, **nothing**.



**Application Support**

**Benefit:** Historically Application Performance Tuning has been an activity that might have been overlooked, not necessarily owned by the Application Support team. Furthermore, the cost of deploying a specialized tool, in terms of software license & CPU overhead might have been restrictive. With the CPU MF SAMPLING function, the ability to analyze CPU usage during Application testing activities now exists, with minimal (~1%) CPU overhead. If HIS data analysis code is written internally, cost is arguably, **nothing**.



**zHISR Software**

**Consideration:** Simplifying the CPU MF data collection & analysis process is possible with the zHISR software, which has been designed for this specific task, using the latest programming techniques. Software licensing & CPU overhead costs are low when compared with traditional Application Performance Tuning techniques, as CPU MF SAMPLING data is used, while software licensing metrics are flexible (E.g. User or MSU based). This solution expedites the analysis of application code that could be optimized.

**CPU MF delivers benefit for no cost, zHISR offers process optimization...**

# ***CPU MF & zHISR: Useful Information Resources***

How to Benefit From Hardware Instrumentation Services Data

<http://enterprisesystemsmedia.com/article/how-to-benefit-from-hardware-instrumentation-services-data>

Setting Up and Using the IBM System z CPU Measurement Facility with z/OS (REDP-4727-00)

[www.redbooks.ibm.com/redpieces/pdfs/redp4727.pdf](http://www.redbooks.ibm.com/redpieces/pdfs/redp4727.pdf)

CPU MF Overview and WSC (z10) Experiences: SHARE 2010

[www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/TC000041](http://www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/TC000041)

CPU MF Overview and WSC (z196) Experiences: SHARE 2012

[www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/TC000066](http://www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/TC000066)

z/OS CPU MF Enablement Education

[www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/PRS4922](http://www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/PRS4922)

Report Generator for Hardware Instrumentation Sample Data

[www-03.ibm.com/systems/z/os/zos/features/unix/tools/hisreport.html](http://www-03.ibm.com/systems/z/os/zos/features/unix/tools/hisreport.html)

zHISR Product Information Introduction

[www.value-4it.com/products/zHISR.html](http://www.value-4it.com/products/zHISR.html)

Getting Started with zPCR (IBM's Processor Capacity Reference)

[www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/PRS1381?OpenDocument&TableRow=4.1.1](http://www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/PRS1381?OpenDocument&TableRow=4.1.1)

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