

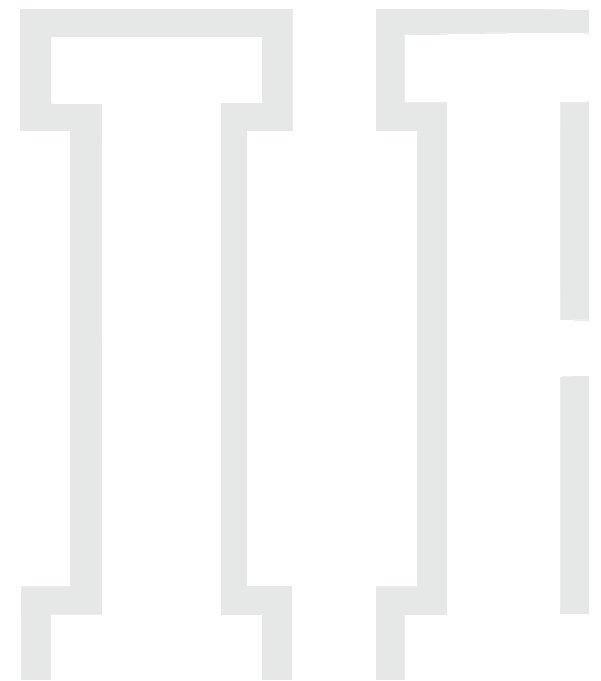


# 9805: Recent z/OS Debugging Enhancements

## The Dark Arts

A Presentation by Nicole M. Fagen

August 2011





# Agenda

SLIPs

IPCS Active

COPYDDIR

Dump Health Scan

GRS

Summary Format

System Trace

DOCPU



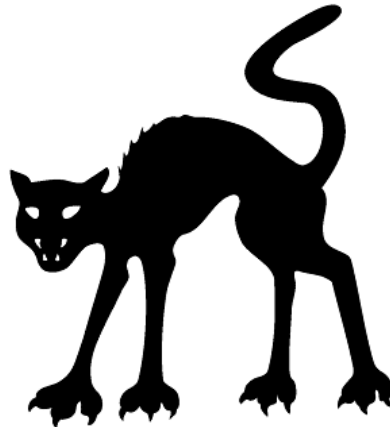


## Dynamic System Name with REMOTE

**Horror:** The names of the REMOTE systems to be included in a dump must be “hardcoded” and declared when the slip was set

**New Technique:** Direct or indirect addresses can be used to look up system names when the trap matches

–System names assumed to be 8 characters



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# Dynamic System Name Example

**Problem Situation:** A system in the sysplex is going in and out of the state of being status update missing, IXC426D is issued on the system detecting the temporary hang. The stall is temporary and the impacted system varies. A timely dump on the stalled system is desired.

- IXC426D SYSTEM system IS SENDING XCF SIGNALS BUT NOT UPDATING STATUS. REPLY SYSNAME= system TO REMOVE THE SYSTEM OR R TO RETRY

```
SLIP SET,MSGID=IXC426D,A=SVCD,  
JOBLIST=(XCFAS),DSPNAME=('XCFAS'.*),  
SDATA=(XESDATA,COUPLE,ALLNUC,CSA,PSA,LPA,LSQA,NUC,RGN,SQA,  
SUM,SWA,TRT),  
REMOTE=(UNCOND,SYSLIST=((3R?+F)),DSPNAME,JOBLIST,SDATA),END
```

This example works if and only if the system name is 8 characters!

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# Gotch-ya

If only a dynamic system name is requested then the display of the slip does not indicate there is a SYSLIST.

```
RESPONSE=SD0
IEE735I 16.38.48 SLIP DISPLAY 615
ID=0011, NONPER, ENABLED
ACTION=SVCD, SET BY CONS NFAGEN, RBLEVEL=ERROR, MATCHLIM=1, 0
MSGID=IXC426D, DSPNAME='XCFAS'.*
SDATA=PSA, NUC, SQA, LSQA, RGN, LPA, TRT, CSA, SWA, SUMDUMP, ALLNUC, COUPLE,
      XESDATA
REMOTE=(
UNCOND
JOBLIST, SDATA, DSPNAME
)
JOBLIST=XCFAS
```



If a hardcode system name is coded along with a dynamic system name then both appear in the display

```
RESPONSE=SD0
IEE735I 16.39.40 SLIP DISPLAY 890
ID=0012, NONPER, ENABLED
ACTION=SVCD, SET BY CONS NFAGEN, RBLEVEL=ERROR, MATCHLIM=1, 0
MSGID=IXC426D, DSPNAME='XCFAS'.*
SDATA=PSA, NUC, SQA, LSQA, RGN, LPA, TRT, CSA, SWA, SUMDUMP, ALLNUC, COUPLE,
      XESDATA
REMOTE=(
UNCOND
SYSLIST=SB0, CURRENT.3R?+F
JOBLIST, SDATA, DSPNAME
)
JOBLIST=XCFAS
```



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# SDUMP Started Message

**Horror:** Dump is taking a long time but message log does not indicate when the dump started

**New Technique:** IEA045I issued to indicate SDUMP started

**IEA045I AN SVC DUMP HAS STARTED AT TIME=*hh:mm:ss*  
DATE=*mm/dd/yyyy* FOR ASIDS(*xx[,xx,....,xx]*)  
ERRORID=SEQ*yyyyyy* CPU*zz* ASID*asid* TIME*hh:mm:ss.t*  
QUIESCE=YES|NO**



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# IPCS ACTIVE

**Horror:** IPCS Active only lets users browse and analyze storage visible to key 8 applications.

**New Technique:** Access to more data!!

- Dataspaces owned by the ASID and visible to key 8 applications are now supported for IPCS users with no special authority
- Users authorized to BLSACTV ADDRSPAC can browse and analyze all storage in the ASID and its data spaces
- Users authorized to facility class BLSACTV SYSTEM can browse and analyze all systems ASIDs and data spaces, as well as, absolute storage
- Keep in mind the view is UNSERIALIZED. The system will not be stopped to execute an IPCS command.



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# COPYDDIR EXPORT / IMPORT

**Horror:** Having to engage additional assistance to pursue root cause on a huge standalone dump which requires the new person to initialize the huge standalone dump

**New Technique:** COPYDDIR EXPORT / IMPORT

EXPORT the directory information to a common dataset

IMPORT the directory to the new dump directory



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IPCS INVENTORY - NFAGEN.ZOS1B5.DIRECTRY -----  
Command ==>

AC	Dump Source	Status
—	DSNAME('ONTOP.GS000.P03548.C672.DUMP.PP1A.PB9AIRLM') Title=ABEND=S026,REASON=08118001,CONNECTOR HANG: CONNAME=DXRPJ0A\$\$PJ9A009,JO Psym=RIDS/IEANUC01#L RIDS/IXLM1TMR VALU/C\$PJ9A009 VALU/H0003 PIDS/5752SCIXL	CLOSED
—	DSNAME('ONTOP.GS075.P61541.C724.DUMP2') Title=SLIP DUMP ID=CJP1 Trap=SLIP SET,ENABLE,ID=CJP1,COMP=0C4,JOBNAME=USACHPZ2,ACTION=SVCD,JOBLIST=(	CLOSED
—	DSNAME('ONTOP.GS100.P43129.C838.LOGGER.DUMP') Title=CQE1MSG1 STRUCTURE DUMP No symptoms	CLOSED
—	DSNAME('ONTOP.GS113.P43516.C848.D205225') Title=ABEND=S026,REASON=08118001,CONNECTOR HANG: CONNAME=SIGPATH_030014DF,JO Psym=RIDS/IEANUC01#L RIDS/IXLM1TMR VALU/C030014DF VALU/H0008 PIDS/5752SCIXL	CLOSED
—	DSNAME('ONTOP.GS113.P43516.C848.D205436') Title=ABEND=S026,REASON=08118001,CONNECTOR HANG: CONNAME=CSQEQT00QT0202,JOBN Psym=RIDS/IEANUC01#L RIDS/IXLM1TMR VALU/C00QT0202 VALU/H0011 PIDS/5752SCIXL	CLOSED
—	DSNAME('ONTOP.GS113.P43516.C848.D205736') Title=END OF MEMORY RESOURCE MANAGER HANG DETECTED: TCB = 007EC0A8, NAME = I Psym=RIDS/IEAVTMMW#L RIDS/IEAVTMMW VALU/C###SCSDS PIDS/5752SCRTM AB/S030D RI	CLOSED
—	DSNAME('ONTOP.GS113.P43516.C848.D210927') Title=IXC102A NOT ANSWERED No symptoms	CLOSED
XP	DSNAME('ONTOP.GS113.P44137.C848.SADMP')	OPEN

F1=HELP F2=SPLIT F3=END F4=RETURN F5=RFIND F6=MORE F7=UP F8=DOWN



```
----- EXPORT DUMP DIRECTORY RECORD -----  
Command ==>  
  
The source dump directory is NFAGEN.ZOS1B5.DIRECTRY  
  
Enter the dsnames for export data set.  
EXPORT DATA SET NAME ==> 'NFAGEN.EXPORT.DIRECT'  
  
Use ENTER to view the continue, END to terminate
```

Place data in a dataset the new user can access



IPCS OUTPUT STREAM -----

Command ==> \_

\*\*\*\*\* TOP OF DATA \*\*\*\*\*

Description of Dump	Records
DSNAME('ONTOP.GS113.P44137.C848.SADMP') . . . . .	11,689
1 dump description copied	

\*\*\*\*\* END OF DATA \*\*\*\*\*



```
----- Copy Dump Directory Data -----  
Command   ===>  
  
Session dump directory is 'NFAGEN.ZOS1B4.DIRECTRY'  
  
Enter or verify the dsname of a source data set.  The following types of  
sets are supported:  
  
- Another dump directory than the session dump directory  
- A RECFM=VB data set produced by a COPYDDIR EXPORT operation  
  
Source dsname ===> 'NFAGEN.EXPORT.DIRECT'  
_   
  
Use ENTER to view the continue, END to terminate
```

Copy into the current directory from the dataset exported into in previous step. Access from Utilities -> COPYDDIR selections of IPCS.



----- Confirm COPYDDIR IMPORT -----

Command ==> \_

Ready to copy description of a source into the current session directory.

Source described is DSNAME('ONTOP.GS113.P44137.C848.SADMP')

Import dsname is 'NFAGEN.EXPORT.DIRECT'

Session dump directory is 'NFAGEN.ZOS1B4.DIRECTRY'

Use ENTER to view the continue, END to terminate



```
IPCS OUTPUT STREAM -----  
Command ==> _  
***** TOP OF DATA *****  
  
Description of Dump                               Records  
DSNAME('ONTOP.GS113.P44137.C848.SADMP') . . . . . 11,689  
1 dump description copied  
***** END OF DATA *****
```

Go ahead and start using the dump



## Dump Health Scan

**Horror:** Large SAD must be FTPd to IBM, delays in the customer's network, IBM's network, etc. results in delays in problem resolution

**New Technique:** Get started with initial problem diagnosis faster using the dump health scan. Key system level IPCS command outputs routed to a PDS.



**z/OS 1.12**





## Dump Health Scan, How it Works

Physically allocate the PDS

ALLOC the PDS as IPCSPDS

```
-ALLOC DDNAME(IPCSPDS)  
        DSNAME('PMRxxxxx.yyy.zzz') SHR
```

Go into IPCS and issue

```
-IP SETDEF PDS
```

```
-IP PROFILE PAGESIZE(2147483647)
```

Issue IPCS commands one at a time

```
-PRINT NOTERM is highly recommended
```

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## PDS Allocation

### Allocate New Data Set

Command ==> \_\_\_\_\_

More:

```
Data Set Name . . . : NFAGEN.PDS.TEST2

Management class . . . MIGONLY      (Blank for default management class)
Storage class . . . STANDARD      (Blank for default storage class)
Volume serial . . . SL629D      (Blank for system default volume) **
Device type . . . _____      (Generic unit or device address) **
Data class . . . _____      (Blank for default data class)
Space units . . . CYLINDER      (BLKS, TRKS, CYLS, KB, MB, BYTES
or RECORDS)

Average record unit _____      (M, K, or U)
Primary quantity . . 1          (In above units)
Secondary quantity 20         (In above units)
Directory blocks . . 20         (Zero for sequential data set) *
Record format . . . VBA
Record length . . . 255
Block size . . . 32760
Data set name type PDS      (LIBRARY, HFS, PDS, LARGE, BASIC, *
EXTREQ, EXTPREF or blank)
```



# DUMP Health Scan PDS Contents

<b>IPCS subcommand</b>	<b>PDS member</b>
ANALYZE RESOURCE	ANALYZE
ASMK	ASMK
COMK	COMK
COPYCAPD	COPYCAPD
IOSK ALL VALIDATE	IOSK
STATUS CPU WORKSHEET	STATUS
SYSTRACE ALL TIME(LOCAL)	SYSTRACE
SYSTRACE TTCH(LIST)	SYSTRACE
VERBX MTRACE	VERBX
VERBX SADMPMSG	VERBX



# GRS

**Horror:** Large dump, lots of resources, takes forever and a day to do finds in GRS report outputs

## New Techniques

- Code restructured to yield performance improvements
- New filtering options to reduce data presented to user
- Panel driven interface
- More attributes relayed about resources of interest
  - Event TOD and ENQ history (request, contention, ownership)
  - Altered by RNLs, Exits, 3<sup>rd</sup> party managed
  - Directed ENQ details, requesting TCB / Target TCB



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----- IPCS MVS DUMP COMPONENT DATA ANALYSIS -----

To display information, specify "S option name" or enter S to the left of the option desired. Enter ? to the left of an option to display help regarding the component support.

<u>S</u>	<u>Name</u>	<u>Abstract</u>
_	DLFTRACE	Data Lookaside Facility trace
<u>S</u>	GRSDATA	GRS managed resources
_	IMSDUMP	IMS analysis
_	IOSCHECK	Active input/output requests
_	IPCSDATA	IPCS control data
_	IRLM	IMS Resource Lock Manager analysis
_	JESXCF	JESXCF Address Space Analysis
_	JES2	JES2 analysis for HJE7780, service level 0
_	JES3D	JES3 analysis
_	LEDATA	Language Environment formatter
_	LISTEDT	Format eligible device table
_	LLATRACE	Library Lookaside trace
_	LOGDATA	LOGREC formatter
_	LOGGER	System logger formatter

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OPTION ==>

SCROLL ==> **CSR**

F1=HELP

F2=SPLIT

F3=END

F4=RETURN

F5=RFIND

F6=MORE

F7=UP

F8=DOWN

F9=SWAP

F10=LEFT

F11=RIGHT

F12=retrieve



```
----- IPCS - GRSDATA SUBCOMMAND -----
SELECT OPTION ==>          S_
Select a report type. The default is:
  _ GRSDATA                * GRSTRACE
Select a level of detail. The default is SUMMARY
  * SUMMARY                _ DETAIL (GRSTRACE only)
Select the time format to use for the GRSTRACE report. The default is LOCAL.
  _ LOCAL                  _ GMT                _ UTC
Select zero or more filtering options. The default is NO filtering.
Filters that do not apply to a given report will be ignored.
  SYSNAME  _____  JOBNAME  _____
  QNAME    SYSZMCS_
  RNAME    SYSMCS#MCS_
  SCOPE:   _ STEP      * SYSTEM  _ SYSTEMS
           _ CONTENTION  _ RESERVE
  START TIME MM/DD/YY,HH:MM:SS.DDDDDD  STOP TIME MM/DD/YY,HH:MM:SS.DDDDDD

VERBX GRSTRACE ' SUMMARY QNAME(''SYSZMCS'') RNAME(''SYSMCS#MCS'') SYSTEM '

S = START  selected report.
R = Reset  all panel variables.
END = Exit  GRSDATA panel.
```

GRSDATA contains all global resources if GRSQ Setting is CONTENTION

GRSTRACE has details for all the resources this system is interested in both LOCAL and GLOBAL

Select QNAME / RNAME to focus on

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IPCS OUTPUT STREAM -----  
Command ==> \_

\*\*\*\*\* TOP OF DATA \*\*\*\*\*

\* \* \* \* \* GLOBAL RESOURCE SERIALIZATION CONTROL BLOCK PRINT \* \* \* \* \*

Options list:

Report..... GRTRACE

Level of detail..... SUMMARY

Requested time format.. LOCAL

Filter(s) in use:

QNAME..... SYSZMCS

RNAME..... SYSMCS#MCS

SYSTEM

\* \* \* \* \* DIAGNOSTIC DATA \* \*

GVT 00000000\_00FE25B8

GVTX 00000000\_007EB000

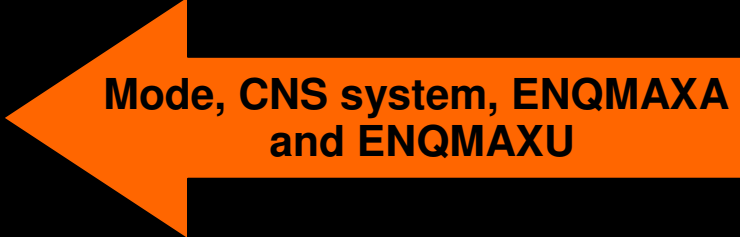
GOHT 00000000 00000000



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```
IPCS OUTPUT STREAM -----  
Command ==> _  
SGHT          00000028_F8F00000  
LQHT          00000028_F8E00000  
STHT          00000000_7F58A000  
RPT           00000000_7FFB7EE0  
  
* * * * * CONFIGURATION INFORMATION * * * * *  
GRS Mode      STAR  
Synchres Setting Yes  
Active Exits  ISGNQXITFAST  
GRSQ Setting  Contention  
CNS           R22  
CTRACE Buffer size (K) 128  
The EQDQ monitor is Off  
ENQMAXA      250000  
ENQMAXU      16384  
  
*****  
*****  
*****                                     *****  
***** STEP QUEUE (STHT) CONTROL BLOCK PRINT *****  
*****                                     *****  
*****
```



Mode, CNS system, ENQMAXA and ENQMAXU





IPCS OUTPUT STREAM -----

Command ==> \_

```
*****
*****
*****
***** LOCAL QUEUE (LQHT) CONTROL BLOCK PRINT *****
*****
*****
*****
*****
```



MAJOR NAME: SYSZMCS

```
* MINOR NAME: SYSMCS#MCS
  SCOPE: SYSTEM      SYSNAME: RB2      STATUS: *EXCLUSIVE* /OWN
  ASID: 0000000A    TCB: 007F6B58    JOBNAME: CONSOLE
  Critical ENQ Time(s):
    Request:        07/20/2011 14:45:52.924100
    Grant:          07/20/2011 14:45:52.924124
  SCOPE: SYSTEM      SYSNAME: RB2      STATUS: *EXCLUSIVE* /WAIT
  ASID: 0000000A    TCB: 007F4B58    JOBNAME: CONSOLE
  Critical ENQ Time(s):
    Request:        07/20/2011 14:45:56.162531
    Contention:     07/20/2011 14:45:56.162567
  SCOPE: SYSTEM      SYSNAME: RB2      STATUS: *EXCLUSIVE* /WAIT
```

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----- IPCS - GRSDATA SUBCOMMAND ----- Enter option

SELECT OPTION ==>

S

Select a report type. The default is the GRSDATA report type.

\_ GRSDATA \* GRSTRACE

Select a level of detail. The default is SUMMARY.

\_ SUMMARY \* DETAIL (GRSTRACE only)

Select the time format to use for the GRSTRACE report. The default is LOCAL.

\_ LOCAL \_ GMT \_ UTC

Select zero or more filtering options. The default is NO filtering.

Filters that do not apply to a given report will be ignored.

SYSNAME \_\_\_\_\_ JOBNAME \_\_\_\_\_ ASID x' \_\_\_\_\_ ' TCB x' \_\_\_\_\_ '

QNAME SYSZMCS\_

RNAME SYSMCS#MCS\_\_\_\_\_

SCOPE: \_ STEP \* SYSTEM \_ SYSTEMS

\_ CONTENTION \_ RESERVE

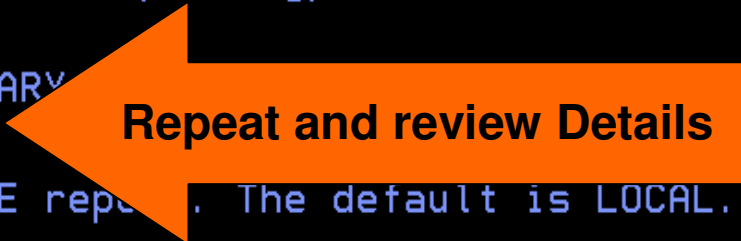
START TIME MM/DD/YY,HH:MM:SS.DDDDDD STOP TIME MM/DD/YY,HH:MM:SS.DDDDDD

VERBX GRSTRACE ' DETAIL QNAME(''SYSZMCS'') RNAME(''SYSMCS#MCS'') SYSTEM '

S = START selected report.

R = Reset all panel variables.

END = Exit GRSDATA panel.



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IPCS OUTPUT STREAM

Command ==>

MAJOR NAME: SYSZMCS

Resource

\* MINOR NAME: SYSMCS#MCS

Resource Creation Time: 07/20/2011 14:45:52.924123

SCOPE: SYSTEM SYSNAME: RB2 STATUS: \*EXCLUSIVE\* /OWN

ASID: 0000000A TCB: 007F6B58 JOBNAME: CONSOLE

Critical ENQ Time(s):

Request: 07/20/2011 14:45:52.924100

Grant: 07/20/2011 14:45:52.924123

Status of resource, time ENQ requested  
Time ENQ granted

Caller's PSW

Caller PSW: 070C1000\_9C897892

Request Type: LINKAGE=SYSTEM

RNL = NO

QEL: 00000008\_00316A60 QXB: 00000008\_00314EE0

QCB: 00000008\_00029CB8 RB: 007F6AD0

SCOPE: SYSTEM SYSNAME: RB2 STATUS: \*EXCLUSIVE\* /WAIT

ASID: 0000000A TCB: 007F4B58 JOBNAME: CONSOLE

Critical ENQ Time(s):

Request: 07/20/2011 14:45:56.162531

Contention: 07/20/2011 14:45:56.162567

Caller PSW: 070C1000\_9C89A892

Request Type: LINKAGE=SYSTEM

QCB: 00000008\_00029CB8 RB: 007F60E8

SCOPE: SYSTEM SYSNAME: RB2 STATUS: \*EXCLUSIVE\* /WAIT

ASID: 0000000A TCB: 007F49C0 JOBNAME: CONSOLE

Critical ENQ Time(s):

Request: 07/20/2011 14:45:57.354359

Contention: 07/20/2011 14:45:57.354382

Caller PSW: 070C1000\_9C89E892

Request Type: LINKAGE=SYSTEM

RNL = NO

QEL: 00000008\_00316DC0 QXB: 00000008\_003191F0

QCB: 00000008\_00029CB8 RB: 007F4938

SCOPE: SYSTEM SYSNAME: RB2 STATUS: \*EXCLUSIVE\* /WAIT

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```
----- IPCS - GRSDATA SUBCOMMAND -----
SELECT OPTION ==>  S
Select a report type. The default is the GRSDATA report type.
 * GRSDATA      GRSTRACE
Select a level of detail. The default is SUMMARY reporting.
 * SUMMARY      DETAIL (GRSTRACE only)
Select the time format to use for the GRSTRACE report. The default is LOCAL.
  LOCAL      GMT      UTC
Select zero or more filtering options. The default is NO filtering.
Filters that do not apply to a given report will be ignored.
SYSNAME _____ JOBNAME _____ ASID x' _____ ' TCB x' _____ '
QNAME      SYSZJES2
RNAME
SCOPE:  _ STEP      _ SYSTEM      _ SYSTEMS
        _ CONTENTION      _ RESERVE
START TIME MM/DD/YY,HH:MM:SS.DDDDDD  STOP TIME MM/DD/YY,HH:MM:SS.DDDDDD

GRSDATA SUMMARY QNAME('SYSZJES2')

S = START  selected report.
R = Reset  all panel variables.
```

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# GRSDATA Output for SYSZJES2

Global systems resources

Major.. CL8'SYSZJES2'

Minor.. CL050'PP1JS1SYS1.JESCKPT1'

SCOPE.. SYSTEMS	SYSNAME.. PP1B	JOBNAME.. JES2	RESERVE
ASID.. 002C	TCB..... 008FF370	STATUS.. EXCLUSIVE	
SCOPE.. SYSTEMS	SYSNAME.. PP1D	JOBNAME.. JES2	RESERVE
ASID.. 0022	TCB..... 008FF370	STATUS.. WAITEXC	ECB..... 2A5BA170
SCOPE.. SYSTEMS	SYSNAME.. PP1C	JOBNAME.. JES2	RESERVE
ASID.. 002C	TCB..... 008FF370	STATUS.. WAITEXC	ECB..... 2A5BA170

Latch Statistics





## SUMMARY Subcommand

**Horror:** Output of IP SUMM FO can be very very very long

**New Technique:** New options to enable IPCS users to focus on a sole TCB or EXCLUDE(GLOBAL,JPQ,LOADLIST). Panel driven or command driven.

- EXCLUDE(GLOBAL) causes global SRB formatting to be omitted.
- EXCLUDE(JPQ) causes job pack queue formatting to be omitted.
- EXCLUDE(LOADLIST) cause load list formatting to be omitted.

IP SUMM FO ASID(6) TCB(xxxxx)

IP SUMM FO ASID(6) EXCLUDE(GLOBAL,JPQ,LOADLIST)



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----- IPCS MVS Analysis of Address Spaces -----

Enter/verify options for analysis of address spaces and tasks.  
Use ENTER to start analysis, END to terminate.

REPORT

TYPE ==> E (F - format, J - jobsummary, K - keyfield,  
R - keyfield with registers, T - tcbsummary)

ASID selection

All ASIDs ==> \_ Error ASIDs ==> \_  
Current ASIDs ==> / (default) TCBERROR ASIDs ==> \_  
ASID by name ==> \_\_\_\_\_ ASID by number ==> \_\_\_\_\_ (hexadecimal)

SUMMARY FORMAT qualification

Exclude Loadlist ==> \_ Global ==> / JPQ ==> \_  
Select TCB address ==> \_\_\_\_\_ (hexadecimal)

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COMMAND ==>

---

F1=HELP	F2=SPLIT	F3=END	F4=RETURN	F5=RFIND	F6=MORE
F7=UP	F8=DOWN	F9=SWAP	F10=LEFT	F11=RIGHT	F12=retrieve



## IP SUMM FO ASID(6) TCBADDR(x'7d1178')

SRBs

Work Unit Queues

ASCB

ASSB

ASXB

PC tables

Formatted TCB x'7D1178'

\*Does not have all of the "other" TCBs

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## IP SUMM FO ASID(6) EXCLUDE(GLOBAL)

Work Unit Queues

ASCB

ASSB

ASXB

PC tables

All TCBs in ASID 6 formatted

SRBs not formatted

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# System Trace

**Horror:** History is not long enough to see the problem in the system trace table. Faster processors make this even worse.

**New Technique:** System trace buffers can be made larger and new “M” for megabyte notation accepted.

TR ST,{nnnK,nnnM}



Horror Remains: Buffers are below the line and that's a lot of storage!

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## System Trace

**Horror:** We have the ability to specify HUGE system trace buffers and they reside below the bar!

**New Technique:** System trace buffers moved above the bar,

- Ability to specify in “G” gigabytes
- New default per processor is 1M
- 1M is the minimum per processor.



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# System Trace

**Horror:** Turning on branch tracing also turns on mode tracing

**New Technique:** Branch tracing and mode tracing are controlled individually

```
TRACE ST,BR={ON|OFF},MODE={ON|OFF}
```



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# System Trace

TRACE ST,{nnnK|nnnM|nG}

- Each CPU will be allotted the amount of storage declared
- If “K” is specified 1M is allotted

TRACE ST,BUFSIZE={nnnnnK|nnnnnM|nnnG}

- All CPUs will share the storage allotment declared
- Much wiser and easier for complete system planning

**Caution:** Always take into consideration the amount of real storage on the system. Larger trace buffers means less pages available for other system work. More storage for trace buffers may cause a system level performance problem.

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## 5 Words Captured on SPER

**Horror:** there is some key data that needs to be captured immediately when SPER is trigger

**New Technique:** Ability to capture 5 words of data in SPER system trace entry when a slip hits.



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## 5 Words Captured on SPER

Data to be captured

–displaces Unique Data Fields

- Instruction length code
- translation error address
- PSACLHS/E
- trap ID

–Specify by direct or indirect addressing

–Declare a start and end range

–Processing will always rounded up to word boundary

–Data to be capture truncated at 5 words

```
SLIP SET,IF,...,A=STRACE,STDATA=((2R?,+8),(10000,+4)),END
```

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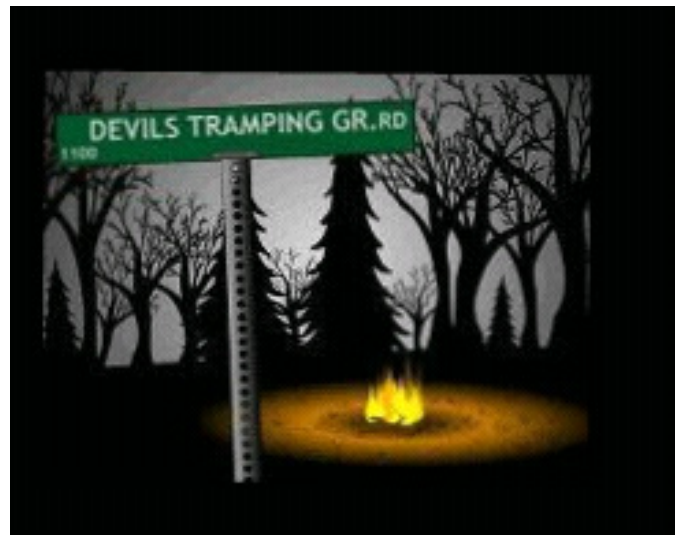
# SYSTRACE SORTCPU

**Horror:** System trace sorts entries in time order. Some problems occur on a single CPU and analysis takes a long time when the traces are fully merged.

**New Technique:** Enable users to sort system trace entries by CPU

IP SYSTRACE SORTCPU(mm/dd/yy, hh:mm:ss:dddddd,n)

- “n” is the number of entries before and after the specified time to show in the output



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# IP SYSTRACE SORTCPU(07/05/11,13:29:59.200299,5)

```
----- SYSTEM TRACE TABLE -----  
--  
--  
PR ASID WU-ADDR- IDENT CD/D PSW----- ADDRESS- UNIQUE-1 UNIQUE-2 UNIQUE-3 PSACLHS- PSALOCAL PASD SASD TIMESTAMP-LOCAL CP  
UNIQUE-4 UNIQUE-5 UNIQUE-6 PSACLHSE DATE-07/05/2011  
  
***** TRACE DATA FOR CPU00 FOLLOWS.  
00 0001 00000000 WAIT 13:29:59.192972 36  
00 0001 00000000 CALL 070E0000 00000000 00000000 00000000 00000000 00000000 0001 0001 13:29:59.192973 36  
00 0001 00000000 WAIT 13:29:59.193439 36  
00 005C 03118300 SRB 070E0000 00000000 00000000 00000000 00000000 00000000 005C 005C 13:29:59.200285 32  
00 005C 03118300 SSRV 78 811F3FA0 4000E552 00000058 009C9FA8 Getmain 13:29:59.200296 32  
005C0000  
***** CP TIME = 13:29:59.200299  
00 005C 03118300 SSRV 78 811F3FC2 13:29:59.200299 32  
005C0000  
00 0001 00000000 WAIT 13:29:59.201292 20  
00 0001 00000000 CALL 070E0000 00000000 00000000 00000000 0001 0001 13:29:59.201402 24  
00 005C 009D4950 DSP 070C0000 811F415C 00000000 009CB6C0 0300F3A0 00000000 00000000 005C 005C 13:29:59.201407 24  
00 005C 009D4950 SSRV 78 811F42BE 0000F503 00000080 0300F3A0 Freemain 13:29:59.201412 24  
005C0000
```

**Data for CPU00**

**5 entries before requested time on CPU00**

**Focal Time**

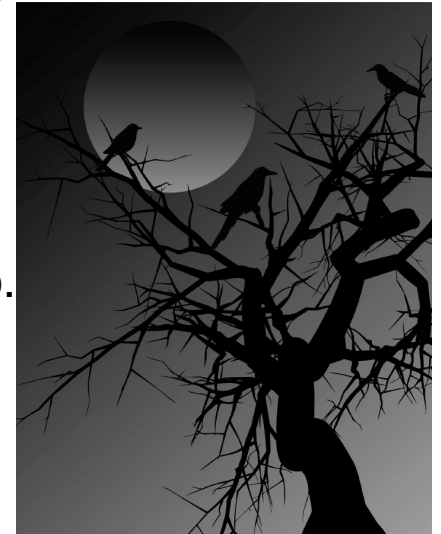
**5 entries after requested time on CPU00**



# System Trace Performance Analysis

**Horror:** Nightmare to do performance analysis by hand in a dump.

**New Technique:** Introduction of SYSTRACE PERFDATA



PERFDATA ([SHOWTRC] [DOWHERE] [SIGCPU(sss.ddddd)])

- SHOWTRC requests the system trace table be displayed in the output
- DOWHERE requests WHERE on the PSWs within CLKC and SRB analysis sections of PERFDATA
- SIGCPU requests CLKC analysis and WHERE analysis for SRB events be bypassed for usage less than the specified time

**Always always always keep in mind this is a very tiny focused picture. It is relevant for the time covered but may not reflect they overall system view.**

**z/OS 1.12**



# Summary of Contents of PERFDATA Report

CPU usage summary

CPU breakdown by ASID

SRB breakdown by ASID

–With WHERE info

TCB breakdown by ASID

CLKC events

–With WHERE info

Lock information

SSCH to I/O times

**z/OS 1.12**



# IP SYSTRACE PERFDATA

No address spaces with the CURRENT attribute were found

Note: Only SYSTRACE records available for ALL PROCESSORS are considered.

System: MCEYS1 SP7.1.2 HBB7770

PERFDATA Analysis:

CPU#	Went from	To	Seconds	SRB Time	TCB Time	Idle Time	CPU Overhead
01	17:29:58.257288	17:30:02.782979	4.525691	0.224277	0.327805	3.868902	0.128643
00	17:29:58.258513	17:30:02.785919	4.527406	0.396144	0.783116	3.141108	0.240969
02	17:29:58.280770	17:30:02.785971	4.505201	0.001450	0.001013	4.501923	0.001918
			13.558299	0.621872	1.111934	11.511933	0.371531

SRB time : 0.621872  
 TCB time : 1.111934  
 Idle time : 11.511933  
 CPU Overhead : 0.371531

Total : 13.558299

Operates on the Intersection of all trace buffers

Summary for each processor

Summary for all processors  
 SRB Time, TCB time, Idle Time, CPU Overhead

Lots of Idle Time  
 Caution: zIIPs, zAAPs processed  
 The same as GP



Found 104 address spaces in SYSTRACE.  
 Found 230 SRB and SSRB PSMs in SYSTRACE.

CPU breakdown by ASID:

ASID	Jobname	SRB Time	TCB Time	Total
0067	RMF	0.006995	0.005196	0.012191
0079	ZESCM	0.000095	0.002359	0.002454
0024	JES2MON	0.003534	0.057579	0.061114
0001	*MASTER*	0.006579	0.002225	0.008805
006B	NET	0.135695	0.018589	0.154284
0006	XCFAS	0.131358	0.367775	0.499133
0071	RCS	0.003644	0.001970	0.005614
0083	EKM	0.007061	0.001013	0.008075
0061	TCPIP	0.079679	0.019590	0.099269
0075	TN3270	0.045144	0.027801	0.072946
0085	ZT17MSTR	0.012100	0.005796	0.017897
0027	NFSC	0.000470	0.000895	0.001366
0056	ZCICSZJ	0.001101	0.000760	0.001862
005C	SMSYSAM	0.022346	0.055299	0.077646
000B	WLM	0.004230	0.117218	0.121448
0029	JES2S001	0.004554	0.004564	0.009119
0026	JES2	0.002373	0.040293	0.042666

... lines omitted ...

00A7	LDAPSRV	0.000194	0.000000	0.000194
0051	BPXOINIT	0.000993	0.003040	0.004033

-----  
 0.621872 1.111934 1.733807 (No. of PUs in Systrace: 3)

Total address spaces observed  
 Running in the intersect of trace buffer

Breakdown by asid / jobname  
 SRB Time, TCB Time  
 Total Time  
 Caution: Not sorted!

Caution: Includes work running  
 On zIIP and zAAPs  
 If the problem is on a GP  
 Data may not be applicable

Totals

SRB breakdown by ASID:



ASID	Jobname	SRB	PSW	# of SRBs	Time
0067	RMF	070C0000	811F3E14	14	0.005065
0067	RMF	070C0000	84610000	1	0.000417
0067	RMF	070C0000	8469B0C8	2	0.001512
					-----
					0.006995

ASID	Jobname	SRB	PSW	# of SRBs	Time
0079	ZESCM	070C0000	84610000	1	0.000095

ASID	Jobname	SRB	PSW	# of SRBs	Time
0024	JES2MON	070C0000	811F3E14	88	0.003463
0024	JES2MON	070C0000	84610000	1	0.000071
					-----
					0.003534



TCB breakdown by ASID:

ASID	Jobname	TCB Adr	# of DSPs	Time
0067	RMF	009E47E8	28	0.005196

ASID	Jobname	TCB Adr	# of DSPs	Time
0079	ZESCM	009D5328	2	0.000781
0079	ZESCM	009D5E88	2	0.001577
				0.002359

ASID	Jobname	TCB Adr	# of DSPs	Time
0024	JES2MON	009FF148	87	0.057533
0024	JES2MON	009D7BF8	2	0.000045
				0.057579

**I/O Timings observed in System trace table**

```

SSCH to I/O times:
Device      SSCH Issued      I/O Occurred      Duration
-----
E463  17:29:58.618556  17:29:58.619699      0.001143

Device      SSCH Issued      I/O Occurred      Duration
-----
E461  17:29:58.618580  17:29:58.619729      0.001149
E461  17:29:58.619808  17:29:58.622719      0.002910
E461  17:29:58.622779  17:29:58.626976      0.004197
-----
                                0.008257

Events for E461 :           3
Quickest I/O    :           0.001149
Slowest I/O     :           0.004197
Total           :           0.008257
Average         :           0.002752
    
```





# IP SYSTRACE PERFDATA(DOWHERE)

Summary sections at the top are the same

```
SRB breakdown by ASID: (WHERE command bypassed for CPU usage less than 0.100000):
```

WHERE success same ratio as WHERE success in dumps

```
ASID Jobname      SRB PSW          # of SRBs      Time                                     Where Info
-----
006B NET          070C0000 811F3E14        61          0.022359
Errors detected in STRUCTURE(Xt1st) at NOCPU ASID(X'0001') FBCA2C:
Located via STRUCTURE(Cdemajor) at NOCPU ASID(X'0001') FBCA00
  Not on doubleword boundary
Errors detected in STRUCTURE(Cdemajor) at NOCPU ASID(X'0001') FBCA00:
  Locator CDXLMJP=00FBCA2C It may be damaged
006B NET          070C0000 B6A4C6D0        293         0.112009 RC= 4 for WHERE 36A4C6D0 ASID(07) command
006B NET          070C0000 8105BDC8         4          0.000187
006B NET          070C0000 816B8F00         1          0.000705
006B NET          070C0000 84610000         1          0.000432
-----
                                0.135695
```



## IP SYSTRACE PERFDATA(DOWHERE) cont.

### TCB breakdown by ASID:

ASID	Jobname	TCB Adr	# of DSPs	Time
0006	XCFAS	009F8E88	206	0.336749
0006	XCFAS	009F9AA0	179	0.011334
0006	XCFAS	009FAA30	239	0.019591
0006	XCFAS	009F8CD8	4	0.000054
0006	XCFAS	009FAE88	3	0.000045
				-----
				0.367775



# IP SYSTRACE PERFDATA(DOWHERE) cont.

## Lock Events:

Lock	ASID	TCB/SRB	Type	PSW	Adr	Suspended at	Resumed at	Suspend Time
CEDQ	0009	009FF230	TCB	B840F2A0		17:30:00.988762	17:30:00.988777	0.000014

## CLKC Events:

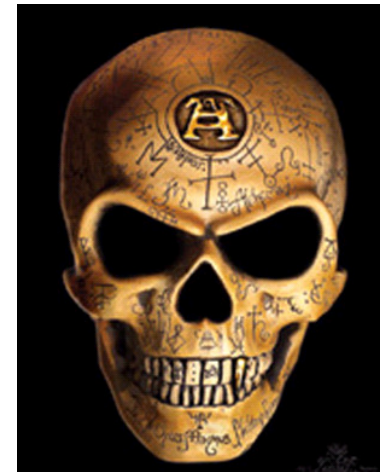
ASID	Jobname	SRB/TCB	Clkc	PSW	Where processing (CPU usage for this ASID is: 0.499133)
0006	XCFAS	009FAA30	070C2000	80FE81CA	ASID(X'0006') 00FE81CA. IEANUC01.IEAVTSFR+03CA IN READ ONLY NUCLEUS
0006	XCFAS	009F8E88	070C0000	80FF2086	ASID(X'0006') 00FF2086. IEANUC01.IEAVELK+048E IN READ ONLY NUCLEUS
0006	XCFAS	009FAA30	070C0000	80FF2086	(Same as above)
0006	XCFAS	009F8E88	070C0000	80FF24FA	ASID(X'0006') 00FF24FA. IEANUC01.IEAVELK+0902 IN READ ONLY NUCLEUS
0006	XCFAS	009F8E88	070C0000	80FF24FA	(Same as above)
0006	XCFAS	009F8E88	070C0000	80FF24FA	(Same as above)
0006	XCFAS	009F8E88	070C0000	80FF24FA	(Same as above)
0006	XCFAS	009F8E88	070C0000	80FF24FA	(Same as above)
0006	XCFAS	009F8E88	070C0000	80FF24FA	(Same as above)
0006	XCFAS	009F8E88	070C0000	80FF24FA	(Same as above)
0006	XCFAS	009F8E88	070C0000	80FF24FA	(Same as above)
0006	XCFAS	009F8E88	070C0000	80FF24FA	(Same as above)
0006	XCFAS	009F8E88	070C0000	80FF24FA	(Same as above)
0006	XCFAS	009F8E88	070C0000	80FF24FA	(Same as above)



# System Trace – CPUMASK

**Horror:** More processors, more data to dig through in the system trace table and elongated problem identification times.

**New Technique:** CPUMASK and CPUTYPE



IP SYSTRACE CPUMASK(24F)

- X'24F' is a bit mask where each bit represents a CPU
  - X'24F' represents CPUs 3,5,8,9,10 and 11
- CPU numbers start with CPU 0 and go to maximum number of CPUs 128
- Really helpful for very large LPARs with a high number of CPUs.

**z/OS 1.13**



# System Trace – CPUTYPE

**Horror:** More types of processors, where the profiles for the processors differ greatly as the work eligible to run on the processors differs, more data to dig through in the system trace table and elongated problem identification times.

**New Technique:** CPUTYPE

IP SYSTRACE CPUTYPE(ZAAP,ZIIP,STANDARD)

- ZAAP is abbreviated as ZA
- ZIIP is abbreviated as ZI
- STANDARD represents the classic general purpose processors and is abbreviated as CP or S
- Blanks or commas can be used to separate the options



**z/OS 1.13**



# System Trace – CPUMASK and CPUTYPE

CPUMASK and CPUTYPE options can be combined the output is the union of the two

**z/OS 1.13**



## DOCPU

**Horror:** Obtaining diagnostic data from each processor in a standalone dump

**New Technique:** DOCPU

IP DOCPU

IP DOCPU CPU(list)

- CPU(0) – only processor 0
- CPU(3:5) – processors 3,4 and 5
- CPU(x'B') – only processor 11

IP DOCPU CPUTYPE(ZA,ZI,S)

IP DOCPU CPUMASK(401)



**z/OS 1.13**



## DOCPU EXEC((ipcs command))

DOCPU was built with the ability to execute an IPCS command against each processor

```
IP DOCPU CPU(0,1) EXEC((L 1000 LEN(50)))
```

–For processors 0 and 1, display 50 bytes of data starting at address 1000

Gotcha – If you accidentally enter DOCPU on a z/OS 1.13 SVC dump the command will take and no error message is returned. No data is returned either.

**z/OS 1.13**



**The End..**

**Questions??**



# IPCS GRTRACE Summary Output

MAJOR NAME: xmajорname

MINOR NAME: xminorname

SCOPE: xscope    SYSNAME: xsysname    STATUS: xstatus

ASID: xasid      TCB: xtcб      JOBNAME: xjobname

MASID: xmasid    MTCB: xmtcb

Reserve Device: xdevice Volser: xvolver

Critical ENQ Time(s):

Request:      xdate xtime

Contention: xdate xtime

Grant:        xdate xtime

Delta Time Waiting: xdeltatime

Movewaiter: xdate xtime

**z/OS 1.10**

# Example of IP VERBX GRSTRACE 'QNAME("TES?ENQ") SUMMARY' IPCS GRSTRACE Summary Example

MAJOR NAME: TESTENQ

\* MINOR NAME: DUMMYENQ

SCOPE: SYSTEMS SYSNAME: S1 STATUS: \*SHARED\* /OWN

ASID: 0000002C TCB: 006FF020 JOBNAME: GRSTOOL

Critical ENQ Time(s):

Request: 06/04/2007 15:30:05.804018

Grant: 06/04/2007 15:30:05.834250

SCOPE: SYSTEMS SYSNAME: S1 STATUS: \*SHARED\* /OWN

ASID: 00000028 TCB: 006FF020 JOBNAME: GRSTOOL

Critical ENQ Time(s):

Request: 06/04/2007 15:32:18.460284

Contention: 06/04/2007 15:32:18.484524

Grant: 06/04/2007 15:32:34.846436

Delta Time Waiting: 00:00:16.361911

SCOPE: SYSTEMS SYSNAME: S2 STATUS: \*EXCLUSIVE\* /WAIT

ASID: 0000002F TCB: 006FF020 JOBNAME: GRSTOOL

Critical ENQ Time(s):

Request: 06/04/2007 15:33:18.738913

Some ENQ information is unavailable for this remote request

**z/OS 1.10**



# IPCS GRSTRACE Detail Output

MAJOR NAME: xmajorname  
MINOR NAME: xminorname  
Resource Creation Time: xdate xtime  
Last Movewaiter Time: xdate xtime  
SCOPE: xscope SYSNAME: xsysname STATUS: xstatus  
ASID: xasid TCB: xtcbl JOBNAME: xjobname  
MASID: xmasid MTCB: xmtcbl  
Reserve Device: xdevice Volser: xvolsr  
Critical ENQ Time(s):  
Request: xdate xtime  
Contention: xdate xtime  
Grant: xdate xtime  
Delta Time Waiting: xdeltatime  
Movewaiter: xdate xtime  
Caller PSW: xpsw Caller TCB: xcallertcbl  
Request Type: xrequesttype  
RNL Processing Actions: xrnlactions  
Affected by ISGNQXIT/FAST  
Affected by ISGNQXITBATCH/CND  
Managed by an Alternate Serialization Product  
ISGENQ Userdata:  
xuserdata  
QEL: xqeladdr QXB: xqxbaddr  
QCB: xqcbaddr SVRB: xsvrbaddr

**z/OS 1.10**