



JES2 Project
Sessions 2664
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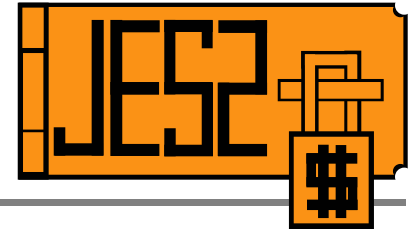
JES2 Diagnostic Techniques

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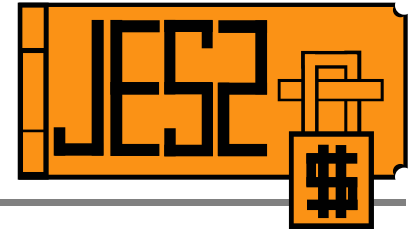
SHARE 104, Winter 2005

Anaheim, CA

Topics



- Catastrophes versus Disasters
- Dump Goodies
- Perfddata
- SAPI Debug tools



Disasters vs Catastrophes

(Poor choice of words?)

The \$HASP088's



```

*$HASP095 JES2 CATASTROPHIC ABEND.  CODE = SOC4 (RC = 00000004)
$HASP080 JES2 SYSTEM DUMP REQUESTED FROM HASPTERM 00158088 + 002FA6
$HASP088 JES2 ABEND ANALYSIS 637
$HASP088 -----
$HASP088 FMID    = HJE7708      LOAD MODULE = HASJES20
$HASP088 SUBSYS  = JES2      z/OS 1.5
$HASP088 DATE    = 2005.011      TIME    = 15.55.15
$HASP088 DESC   = PROTECTION EXCEPTION
$HASP088 MODULE  MODULE      OFFSET  SERVICE  ROUTINE  EXIT
$HASP088 NAME    BASE        + OF CALL LEVEL  CALLED   ##
$HASP088 -----
$HASP088 *HASPJOS 000686D0 + 003BE4 OA08145 *ABEND SOC4 ○
$HASP088 HASPJOS 000686D0 + 007EF6 OA08145 PSTSUBX
$HASP088 HASPJOS 000686D0 + 001292 OA08145 $#POST
$HASP088 HASPJOS 000686D0 + 0007A8 OA08145 PCEPOST
$HASP088 HASPHOPE 00066558 + 0009A2 OA08145 $#ADD
$HASP088 HASPHOPE 00066558 + 0000E6 OA08145 OPPJOB
$HASP088 FAILING INSTR WAS 9110A001
$HASP088 PSW    = 471C1000 8006C2B4 ILC = 4  IC = 04
$HASP088 TEA    = 00000000
$HASP088 ASID   = 0016 (HOME) 0016 (PRIM) 0016 (SCND)
$HASP088 PCE    = HOPE      (06F6D140)
$HASP088 R0     = 00000000 00000B68 07CFA9DC 00000001
$HASP088 R4     = 06F3C9D8 078AB828 09D68AA8 00000000
$HASP088 R8     = 07CFA9DC 80070912 00000B68 00007000
$HASP088 R12    = 8006C1E2 06F6D140 80070ABC 06F3C9D8
    
```

MVS or \$nnn

Exit Code in Control

Standard save area calling sequence

Primary ASID may not be JES2

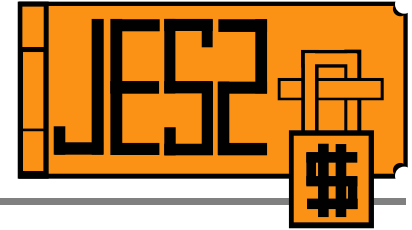
PCE = maintask
DTE=subtask

Disastrous \$HASP096



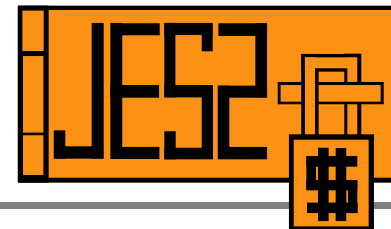
- Spool control block related
 - \$IOT, \$JCT, \$HDB
- Real I/O error reading from spool
 - \$HASP064 issues with IOS error details
- Or Logical error associated with a spooled CB
 - Usually CB does not match expectation
 - Wrong job key, wrong CB type
 - Typically more difficult to debug

\$DISTERR Impact



- Minimal when logical form of error
- Limited to the JOB that caused the error
- No loss of JES2 function

Bane of my Existence



\$HASP096 DISASTROUS ERROR AT SYMBOL **CBIMPL4** IN CSECT HASPNUC,
MTRR=01466904,UNIT=2CE0,VOLSER=WORK03

\$HASP088 JES2 ABEND ANALYSIS 677

\$HASP088 -----

\$HASP088 FMID = HJE???? LOAD MODULE = HASJES20

\$HASP088 SUBSYS = JES2 z/OS ?..?.

\$HASP088 DATE = 2010.042 TIME = 22.05.31

\$HASP088 DESC = DISASTROUS ERROR AT LABEL CBIMPL4

| \$HASP088 | MODULE | MODULE | OFFSET | SERVICE | ROUTINE | EXIT |
|------------------|--------|--------|--------|---------|---------|------|
|------------------|--------|--------|--------|---------|---------|------|

| \$HASP088 | NAME | BASE | + OF CALL | LEVEL | CALLED | ## |
|------------------|------|------|-----------|-------|--------|----|
|------------------|------|------|-----------|-------|--------|----|

\$HASP088 -----

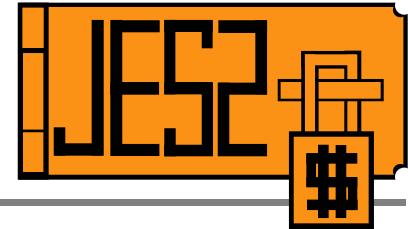
| | | | | | | |
|------------------|---------|----------|----------|---------|--------------|--|
| \$HASP088 | HASPRAS | 0000FD58 | + 000358 | OZ42524 | *ERROR \$DIS | |
|------------------|---------|----------|----------|---------|--------------|--|

| | | | | | | |
|------------------|---------|----------|----------|---------|-----------|--|
| \$HASP088 | HASPNUC | 00006000 | + 006F5A | OZ40371 | \$DISTERR | |
|------------------|---------|----------|----------|---------|-----------|--|

| | | | | | | |
|------------------|----------|----------|----------|---------|---------|--|
| \$HASP088 | HASPTRAK | 000F0510 | + 001AEE | OZ41034 | \$CBIOM | |
|------------------|----------|----------|----------|---------|---------|--|

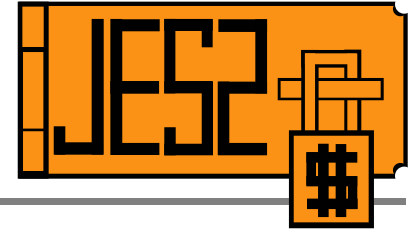
\$HASP088 PCE = PURGE (14B34150)

Catastrophic \$HASP095



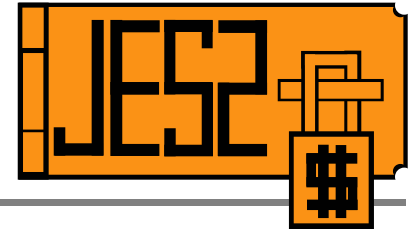
- **CODE=ABEND**
 - MVS detected error (0C4's, 878's, B00's etc)
 - JES2 maintask ESTAE gets control
 - RTM2WA will be present
 - System Trace table more relevant
- **CODE =ERROR**
 - JES2 detected error condition
 - \$Kxx – CKPT read/write problems (HASPCCKPT)
 - \$Qxx – JQE issues (HASPJQS)
 - \$Jxx - JOE issues (HASPJOS)
 - Error regs found in \$ERROR call save area
 - JES2 Ctrace's more applicable

\$ERROR Impact



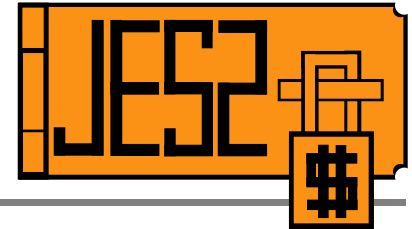
- \$HASP098 Enter Termination Option (ouch!)
 - Required PCE failed and could not be recovered
- \$HASP073 Recovery Successful (much nicer)
 - Normal processing resumed
 - Effect may be limited to the job level
- \$HASP078 Partial Recovery Successful
 - PCE is ended and will not run again
 - Processing continues with one less PCE of that type
 - Eg. JES2 CONTINUES WITHOUT OUTPUT PROCESSOR.
1 OF 2 HOPE PCES REMAIN

Partial Recovery Cont'd



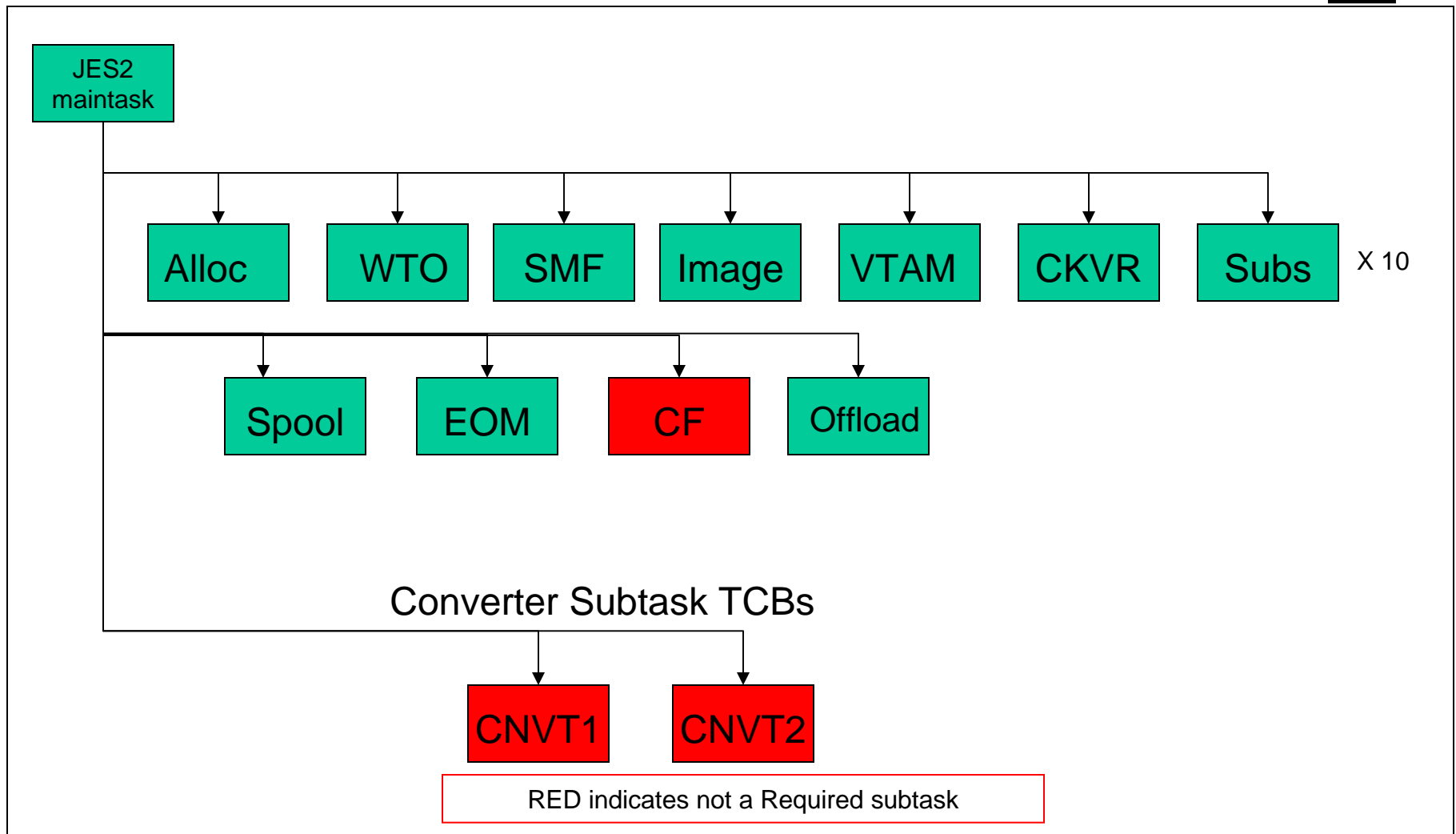
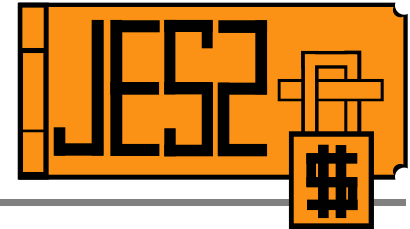
- Ended PCE's prevent clean shutdown
 - \$D PCE(*),ENDED shows all ended PCE's
- Function impacted
 - device oriented PCE's (eg. PRT1) mean device will no longer function
 - Others not so obvious:
 - HOPE - output processing
 - SPI – process SAPI interface calls
 - PSO – XWTR/PSO interface calls
 - MLLM – line manager handles all NJE/RJE BSC/SNA activity
- Partial recovery intended to allow time to schedule hotstart/ipl

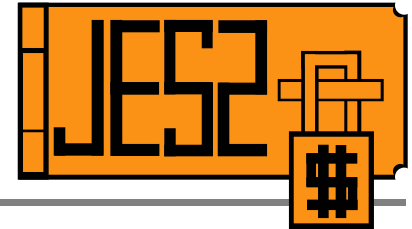
Subtask Failures



- \$HASP078
 - Identifies failing JES2 subtask
 - Always an MVS abend code
- \$DTE not \$PCE in R13
- \$HASP095 error \$Z03 taken when required subtask cannot be recovered
 - Eg. SMF subtask ABEND878 CSA shortage
- Potential function loss when subtask abends
 - VTAM – SNA communications lost
 - CKVR – Checkpoint versions no longer updated

JES2 Subtasks

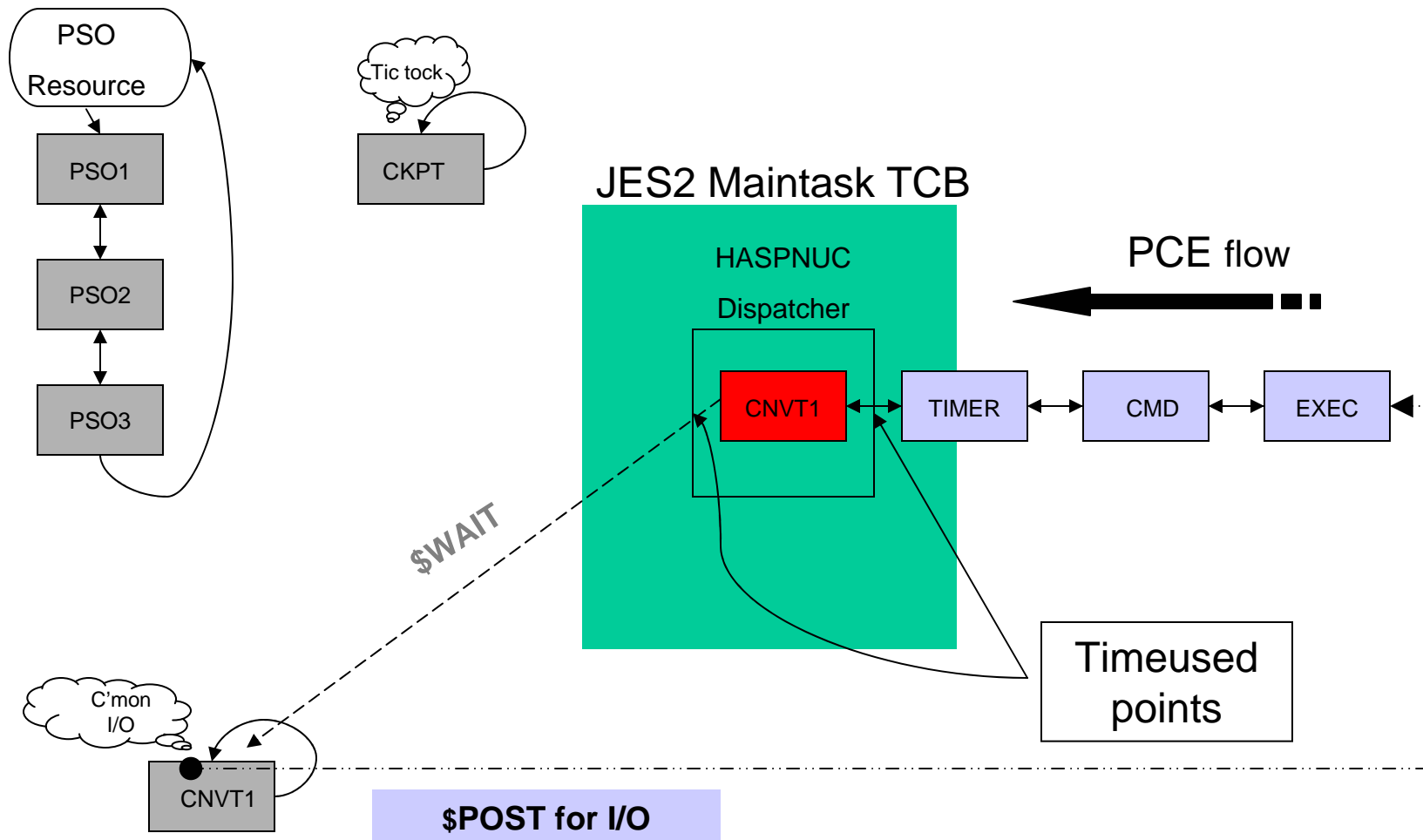
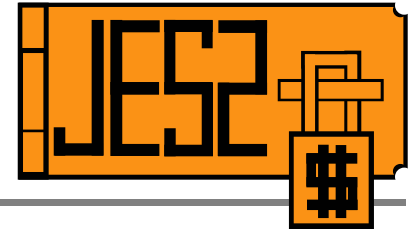




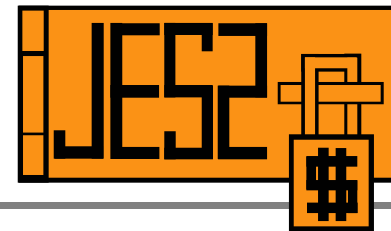
Dump Goodies

(the fun stuff)

30 Second PCE Review



JES2 Base Display (TOP)



IPCS OUTPUT STREAM -----

Command ==> =2;6;s jes2;1;; ← My command shortcut

*** JES2 Base Display ***

Subsystem "JES2" is in address space ASID(X'003C')

Dump for JES2 release="z/OS 1.5", Product level=35, Service level=1 (pointed to by SSCTSUSE); CVTPRODI=HBB7708

Maximum extended region size for "JES2" is 1,397M (per LDAELIM)

*** WARNING: ASCBDSP1=80

System set non-dispatchable and this ASCB is not exempt (per ASCBSSND bit)

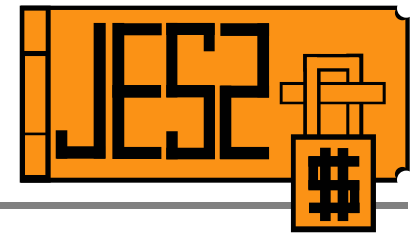
*** WARNING: DEBUG BERT=NO specified (per \$DBGBERT bit off in \$DEBGOPS in \$HCT)

*** WARNING: \$EVENT(s) exist (PCBEVNTF=0 in \$PERFCB)

*** NOTICE: \$QSUSE is NOT in effect (per \$QSONDA bit in \$STATUS in \$HCT)

*** NOTICE: SPOOLDEF FENCE=ACTIVE=YES in effect (per CCTSMVFN bit in CCTSTUS in \$HCCT)

JES2 Base Display (bottom)



```

$PCE: 1AEBA6E0
+0000 PCEEYE... PCE
+0000 PSVID.... PCE          PSVPREV.. 00000000  PSVNEXT.. 2B1C8A28
+00EC RSV..... 00000000
      ***** INTERNAL READER *****
+0000 RDWTEMP.. C2404040  40404040
+0460          40404040  40404040  40404040  40404040

$PSV: 2B1C8A28
+0000 PSVID.... SAVE       PSVPREV.. 1AEBA6E0  PSVNEXT.. 1AEBA6E0
+000C PSVR14... 800EE48A  PSVR15... 000F99EE  PSVR0.... 1AEBAB50
+005A RSV..... 00000000  0000
+0060 PSVSTCK.. BC3A9E26  1B730440
12/06/2004 21:59:18.761264
Routine name: RERROR
000F9A06: HASPRDR (X'000ED1C8') + X'0000C83E'
Address routine called from (assuming normal linkage):
000EE48A: HASPRDR (X'000ED1C8') + X'000012C2'
1 $PSV(s) processed

$DCT: 1A1BF570
+0000 DCTID.... DCT          DCTPCE... 1AEBA6E0  DCTSTAT.. 90
+0028 DCTDEVN.. INTRDR      DCTUCB... 00000000  DCTTOKA.. 1A1CF5F0
+010E RIDFLAG3. 00          RIDRSV3.. 00

** $JQE Address=1BCC49B0, Offset=0000E998, Index=000256
** $JQX Address=1CFD1C40, Offset=00008C28
** Address of first $BERT for this $JQA is 20ECEB98
** BERT lock is not held
** NOTE: $JQA incomplete, all fields past label JQABERT are zero
$JQA: (Composite of $JQE and $JQX)
      JQE.....
+0000 JQEPRIO.. FF          JQETYPE.. 20          JQEJOBNO. 1ED2
    
```

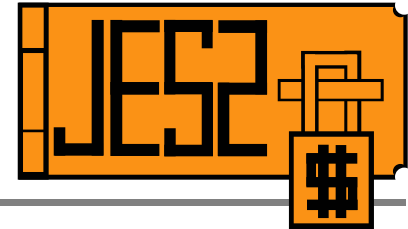
Current PCE

\$Save areas

\$DCT from PCEDCT field

\$JQE from PCEJQE field

JES2 Ctraces



----- CTRACE DISPLAY PARAMETERS -----

COMMAND ===> =2;7;1;d

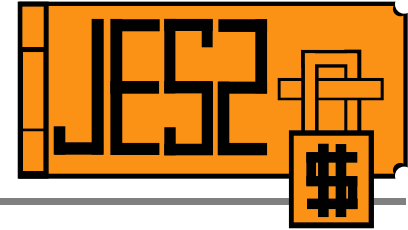
System ===> (System name or blank)
Component ===>SYSJES2 (Component name (required))
Subnames ===>

Component is SYSnnnn

nnnn is the JES2 subsystem: JES2 (usually), JESA etc.

- Three Types for Subname:
 - JOE
 - JQE
 - DISP
- Instorage only
- Always running
- Cannot be put out to CWTR

DISP Entries



SYSA **DISP** 00000421 21:59:16.610981 **Dispatch PCE**

PCE Address->1AE8B638 **Exit->00** **JOB#/offset->**00000000 00000000
Module/seq#->HASPPSO 01960000 **Wait time->**00000000 0027E5AD
\$POST type-->0000

Time length PCE \$WAITed
till Dispatched

Exit Number in Control

Dispatch Point

PCE description:PROCESS SYSOUT PROCESSOR
\$WAIT Events: POST
\$WAIT Resource: PSO
\$WAIT Options:
\$POST Reason: Resource post

\$POST information

SYSA **DISP** 00000420 21:59:16.611114 **PCE \$WAIT**

PCE Address->1AE8B638 **Exit->00** **JOB#/offset->**00001ED1 0000EC54
Module/seq#->HASPNUC 17000000 **Run time->**00000000 00000085
CPU time----00000000 00000085

PSO working on JOB#

Wall Clock Runtime
CPU Usage

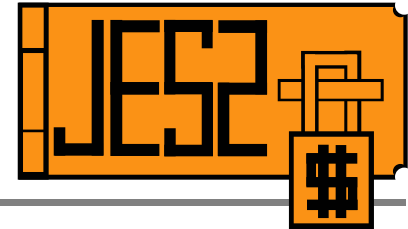
\$WAIT Point

PCE description:PROCESS SYSOUT PROCESSOR
\$WAIT Events: IO
\$WAIT Options:

\$WAIT info

SYSA **DISP** 00000422 21:59:16.610776 **MVS WAIT**

JQE Entries



QMOD moves
JQE from
OUTPUT to
Hardcopy

```
-----  
SYSAS  JQE      00000203  21:59:16.610444  $QMOD  
  
PCE Address->1AE88148  Exit->00  JOB#/offset->00001ED1  0000EC54  
Original Queue->02  New Queue->01  Busy->00  Lock->01  
Artificial JQE  
  
PCE description:OUTPUT PROCESSOR  
-----
```

Macro being traced

\$JQETYPE Changes

```
-----  
SYSAS  JQE      0000020C  21:59:16.610458  $DOGJQE  
  
PCE Address->1AE88148  Exit->00  JOB#/offset->00001ED1  0000EC54  
Original Queue->01  New Queue->01  Busy->00  Lock->01  
  
PCE description:OUTPUT PROCESSOR  
-----
```

\$JQEJLOK - job lock

Joblock Freed

```
-----  
SYSAS  JQE      00000207  21:59:16.610478  $FREJLOK  
  
PCE Address->1AE88148  Exit->00  JOB#/offset->00001ED1  0000EC54  
Original Queue->01  New Queue->01  Busy->00  Lock->00  
Artificial JQE  
  
PCE description:OUTPUT PROCESSOR  
-----
```

```
-----  
SYSAS  JQE      0000020C  21:59:16.826108  $DOGJQE  
  
PCE Address->1AE86638  Exit->00  JOB#/offset->00001ED1  0000EC54  
Original Queue->01  New Queue->01  Busy->00  Lock->00  
  
PCE description:PROCESS SYSOUT PROCESSOR  
-----
```

\$JQEBUSY - job busy
indicator

JOE Entries



```
SYSA      JOE      00000310  21:59:16.606132  $#ADD ←
PCE Address->1AE88148  Exit->00  Job number->00001ED1  JOE offset->00003FC8
Original Class->00  New Class->D8  Busy->00  Type->80
```

Macro being traced

JOE being added to JOT

PCE description:OUTPUT PROCESSOR

```
SYSA      JOE      00000319  21:59:16.611063  $#BUSY
PCE Address->1AE8B638  Exit->00  Job number->00001ED1  JOE offset->00003FC8
Original Class->D3  New Class->D3  Busy->01  Type->80 ←
```

PSO processing this JOE

JOETYPE 80/Work, 40/Char, C0 Free Joe

PCE description:PROCESS SYSOUT PROCESSOR

```
SYSA      JOE      00000312  21:59:16.826295  $#REM
PCE Address->1AE86638  Exit->00  Job number->00000000  JOE offset->00003FC8
Original Class->D3  New Class->D3  Busy->00  Type->C0 ←
```

OUTGRP processed PSO purging it

Offset of Joe into JOT (can be more than one per job)

PCE description:PROCESS SYSOUT PROCESSOR

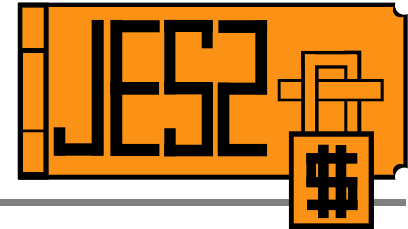
```
SYSA      JOE      0000031A  21:59:18.625218  $#GET
PCE Address->2B1D9180  Exit->00  Job number->00001ED1  JOE offset->00004510
Original Class->D8  New Class->D8  Busy->01  Type->80 ←
```

JOE being selected by Lnn.STn

\$JOEBUSY - joe busy indicator

PCE description:NJE SYSOUT TRANSMITTER

Merging Traces



----- MERGE SPECIFICATION -----

Command ==>

Enter/verify trace specifications for this MERGE operation.

In the left column, type C/G/R: (C = CTRACE G = GTFTRACE R = reset)

C/G/R---Trace Invocation Parameters -----

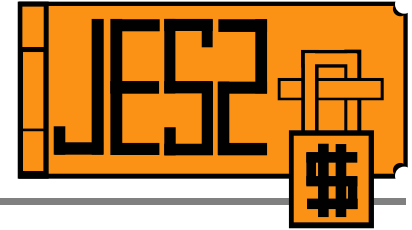
1. CTRACE COMP(SYSJES2) SUB((JOE)) FULL DSNAME('LPARKS.SYSA.DUMP1')
2. CTRACE COMP(SYSJES2) SUB((JQE)) FULL DSNAME('LPARKS.SYSA.DUMP1')
3. CTRACE COMP(SYSJES2) SUB((DISP)) FULL DSNAME('LPARKS.SYSA.DUMP1')
4. CTRACE COMP(SYSJES2) SUB((JOE)) FULL DSNAME('LPARKS.SYSZ.DUMP26')
5. CTRACE COMP(SYSJES2) SUB((JQE)) FULL DSNAME('LPARKS.SYSZ.DUMP26')
- 6.

ENTER = continue MERGE definition.

END/PF3 = return to the MERGE GLOBAL PARAMETERS panel.

S = start MERGE.

Instorage Trace ids



Start JES2 Tracing

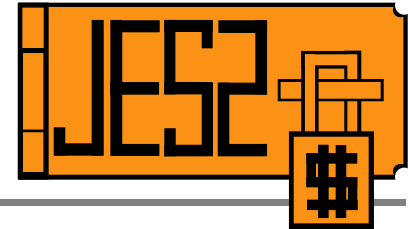
```
$TTRACEDEF, TABLES=20, LOG=(CLASS=H, SIZE=64000)
```

```
$TTRACEDEF, ACTIVE=Y, LOG=(START=NO)
```

```
$STRACE(1,2,18,19)
```

- Tables in ECSA
- Trace tables wrap when LOG=(START=NO)
- New JES2 IPCS option with z/OS 1.5 formats \$TRACE entries in a dump
- Limited formatting support for all trace ids
- JES2 Diagnosis Manual lists all ID types

How they look..



*** In-storage \$TRACE buffers ***

\$TTP number 1 at 0696F008: ←

TTP not TIME order!

Trace ids 1,2,18,19

JES2 Maintask

```
2005.013 20.42.02.390468 ID = 1
2005.013 20.42.02.390481 ID = 2
```



Trace id #

Routine Name

JES2 User Env

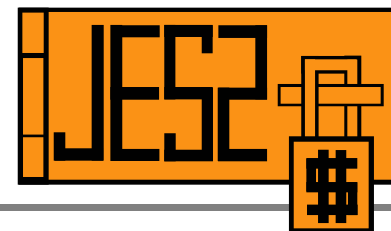
```
2005.013 20.42.02.397338 ID = 18
2005.013 20.42.02.397439 ID = 19
```

```
ASID(X'0016') $CSAVE-A ..... 00000000 SJOBINT R14-R1=
ASID(X'0016') $RETRN-A ..... 00000000 SJOBINT R14-R1=
```

Identifies Asid cutting trace



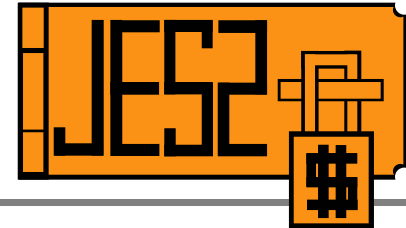
Instorage Trace Example



```
IPCS OUTPUT STREAM -----
Command ==> =2;6;is jes2;7;112; ← My command shortcut
***** TOP OF DATA*****
2005.013 20.39.49.970839 ID = 18 ASID(X'0018') $CSAVE-A ..... 00000000 SSIALOC R14-R1= 832F6324
2005.013 20.39.49.970970 ID = 18 ASID(X'0018') $CSAVE-A ..... 00000000 $SJBLOCK R14-R1= 869C61A0
2005.013 20.39.49.971065 ID = 19 ASID(X'0018') $RETRN-A ..... 00000000 $SJBLOCK R14-R1= 869C61A0
2005.013 20.39.49.971161 ID = 18 ASID(X'0018') $CSAVE-A ..... 00000000 DSNCMP R14-R1= 869C63A0
2005.013 20.39.49.971255 ID = 19 ASID(X'0018') $RETRN-A ..... 00000000 DSNCMP R14-R1= 869C63A0
2005.013 20.39.49.971351 ID = 18 ASID(X'0018') $CSAVE-A ..... 00000000 HALO R14-R1= 869C64F2
2005.013 20.39.49.971519 ID = 18 ASID(X'0018') $CSAVE-A ..... 00000000 HALR R14-R1= 869C7494
2005.013 20.39.49.971713 ID = 19 ASID(X'0018') $RETRN-A ..... 00000000 HALR R14-R1= 869C7494
2005.013 20.39.49.971806 ID = 19 ASID(X'0018') $RETRN-A ..... 00000000 HALO R14-R1= 869C64F2
2005.013 20.39.50.001214 ID = 1 $SAVE-A INTRDR 072E3050 $GETUNIT R14-R1= 800CAA74 0000B058 0000000C
2005.013 20.39.50.001237 ID = 2 $RETRN-A INTRDR 072E3050 $GETUNIT R14-R1= 800CAA74 00000000 0000000C
2005.013 20.39.50.013770 ID = 1 $SAVE-A INTRDR 072E3050 HASPRJCS R14-R1= 800CB690 000D1C08 072E314A
2005.013 20.39.50.015263 ID = 1 $SAVE-A INTRDR 072E3050 RJOBEND R14-R1= 800D1C74 000CCFC0 072E314A
2005.013 20.39.50.015273 ID = 2 $RETRN-A INTRDR 072E3050 RJOBEND R14-R1= 800D1C74 00000000 072E314A
2005.013 20.39.50.015326 ID = 1 $SAVE-A INTRDR 072E3050 $GETBUF R14-R1= 800D1E8A 0000C9D0 072E314A
2005.013 20.39.50.015347 ID = 2 $RETRN-A INTRDR 072E3050 $GETBUF R14-R1= 800D1E8A 00000000 072E314A
2005.013 20.39.50.020655 ID = 1 $SAVE-A INTRDR 072E3050 $QADD R14-R1= 800D2128 00073AB0 00000020
2005.013 20.39.50.022621 ID = 1 $SAVE-A INTRDR 072E3050 $DOGJQE R14-R1= 80074718 8007470A 07C4AD60
2005.013 20.39.50.022633 ID = 2 $RETRN-A INTRDR 072E3050 $DOGJQE R14-R1= 80074718 00000004 07C4AD60
2005.013 20.39.50.022643 ID = 1 $SAVE-A INTRDR 072E3050 $DOGJQE R14-R1= 800757C8 800757BA 07C4AD60
2005.013 20.39.50.022651 ID = 2 $RETRN-A INTRDR 072E3050 $DOGJQE R14-R1= 800757C8 00000004 07C4AD60
2005.013 20.39.50.022662 ID = 2 $RETRN-A INTRDR 072E3050 $QADD R14-R1= 800D212A 00000000 00000020
```

Complete Timestamp

System Trace Tidbits



WU-ADDR- IDENT CD/D PSW----- ADDRESS- UNIQUE-1 UNIQUE-2 TIMESTAMP-GMT
 UNIQUE-4 UNIQUE-5 DATE-01/13/2005

```
006D7418 PC ... 1 0003EDE2 0090C
006D7418 PR ... 0 0003EDE2 01701FEA
006D7418 SVC 2 471C1000 8003FB2E 0003F9B2 00000000 20:42:13.405530
006D7418 SSRV 12A 80009A20 00B4F5F0 40000000 20:42:13.405534
006D7418 SVCR 2 471C1000 8003FB2E 00FD4A82 00000000 20:42:13.405536
006D7418 SVC 1 471C1000 8003EA52 00000000 80000001 20:42:13.405553
006D7418 SVCR 1 471C1000 8003EA52 806D7390 80000001 20:42:13.405554
```

IARVserv -Page Sharing

Typical CKVR subtask pattern

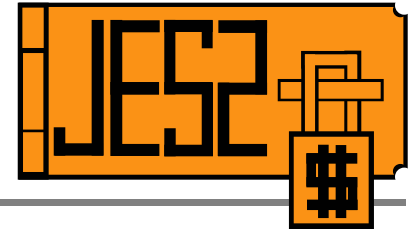
```
006F88D0 DSP 470C0000 80009188 00000000 8000875E 20:42:13.405560
006F88D0 PC ... 1 00009454 00316
006F88D0 PR ... 0 00009454 0141FA98
006F88D0 PC ... 0 069B1206 02204
006F88D0 PR ... 0 069B1206 069AE298
006F88D0 PC ... 1 00009654 00316
006F88D0 PR ... 0 00009654 0141FA98
006F88D0 PC ... 1 00009454 00316
006F88D0 PR ... 0 00009454 0141FA98
006F88D0 PC ... 1 00009654 00316
006F88D0 PR ... 0 00009654 0141FA98
006F88D0 SSRV 1 8000914C 00B4F5F0 00000001 20:42:13.409675
```

TIMEUSED - DISP

PCE running

TIMEUSED - \$WAIT

Handy IPCS Commands



```
006D7418  PC  ...  1  0003EDE2  0090C
```

IPCS OUTPUT STREAM -----

Command ==> IP CBF 0003EDE2 STR(\$MODLOC)

0003EDE2: HASPCKVR (X'0003D6B0') + X'00001732'

```
2005.013 20.39.50.001214  ID = 1  $SAVE-A  INTRDR  072E3050
```

IPCS OUTPUT STREAM -----

Command ==> IP CBF 072E3050 STR(\$PCE) ASID(X'16')

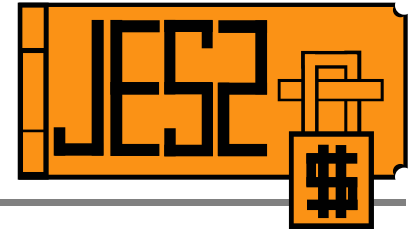
***** TOP OF DATA

\$PCE: 072E3050

+0000 PCEEYE... PCE

+0000 PSVID.... PCE PSVPREV.. 00000000 PSVNEXT.. 072E3050

+0018 PSVR1.... 069CC230 PSVR2.... 069CC138 PSVR3.... 00003000



Perfdata

(Undocumented Goodness)

\$DPERFDATA commands



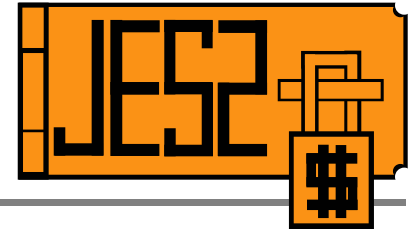
- \$D PERFDATA(INITSTAT) – JES2 initialization stats
- \$D PERFDATA(QSUSE) – PCE \$QSUSE summary
- \$D PERFDATA(PCESTAT) – detailed PCE stats
- \$D PERFDATA(SAMPDATA) – WLM Sampling data
- \$D PERFDATA(CPUSTAT) – PCE CPU usage
- \$D PERFDATA(CKPTSTAT) – CKPT read/write stats
- \$D PERFDATA(SUBTSTAT) – JES2 subtask
- \$D PERFDATA(EVENT) – \$EVENTS captured
- \$D PERFDATA(*) – gives you all of the above
- \$T PERFDATA(*),RESET – resets performance data

Collecting



- `$T PERFDATA(*),RESET`
 - Resets the values
- Wait 10 minutes
 - Or some other interval
- `$DPERFDATA`
 - Displays all PERFDATA information

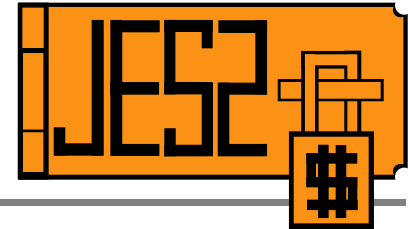
\$DPERFDATA(SAMPDATA)



```
$HASP660 $DPERFDATA(SAMPDATA)
$HASP660 SERVICE CLASSES KNOWN TO JES2:
$HASP660 SRVCLASS(WLMLONG)=(TOKEN=15758000,REGISTERED,SYSTEMS=
$HASP660 (AQFT,AQTS)),
$HASP660 SRVCLASS(WLMSHORT)=(TOKEN=16758000,REGISTERED,SYSTEMS=
$HASP660 (AQFT,AQTS))
$HASP660 SERVICE CLASS SAMPLING DATA:
$HASP660 SRVCLASS(22)=(SYS_QUEUE=0,SYS_INEL=1,SYS_LIMIT=0,
$HASP660 LOCAL_QUEUE=0,CONSTRAINT_AFFINITY=0,LOCAL_INEL=1)
```

- Externalizes JES2 sampling data passed to WLM
- MAS member specific
- Useful for WLM initiator issues eg. jobs/inits not starting
- Sampling section lists service classes with jobs that are AWAITING EXECUTION

Sampling Key Fields

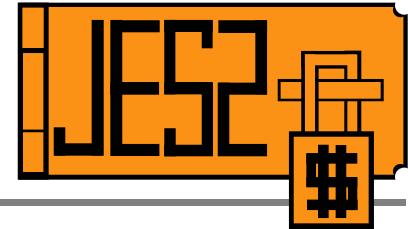


```
$HASP660 SRVCLASS(WLMSHORT)=(TOKEN=16758000,REGISTERED,SYSTEMS=  
$HASP660 (AQFT,AQTS))  
$HASP660 SRVCLASS(22)=(SYS_QUEUE=0,SYS_INEL=1,SYS_LIMIT=0,  
$HASP660 LOCAL_QUEUE=0,CONSTRAINT_AFFINITY=0,LOCAL_INEL=1)
```

x'16' = 22

- **SYS_INEL = Sysplex ineligible** - Jobs that cannot run anywhere in the JESplex
 - Bertlocked, Spools not available, Duplicate jobname, \$H'd, SYSAFF,\$P,\$PXEQ, and Scheduling Environment are determining factors
- **SYS_LIMIT = Sysplex limited** - cannot run due to JOBCLASS LIMITs reached
- **LOCAL_QUEUE = Local queue delay** - Jobs eligible to be initiated on this member.
- **CONSTRAINT_AFFINITY =** Jobs that can only run on constrained systems (z4 and up).
- **LOCAL_INEL = Local ineligible** -Jobs ineligible to run on this member but can run on at least one other.
 - SYSAFF, \$P, \$PXEQ, Scheduling Environment are the determining factors

\$DPERFDATA(CPUSTAT)



CPU PERFORMANCE STATISTICS - **INTERVAL**=13:49:49.926816,
CPU=8:55.859116,

Header Line

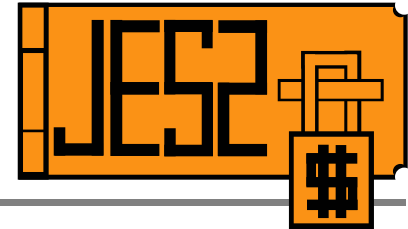
- **INTERVAL** - length of time data has been accumulating
- **CPU** - CPU time used over that interval

PCENAME=NET.SR, **CPU%**=7.63, **CPU**=40.892083, **TIME**=43.011997,
QSUSE_TIME=0.277515, **IOCOUNT**=278356, **CKPT_COUNT**=7631,

PCE Entry

- **PCENAME** - name of the group of PCE's captured (see \$DPCE for details)
- **CPU%** - percentage of total JES2 maintask time this subset of PCE's used
- **CPU** - total CPU time used by this subset of PCE's
- **TIME** - Wall clock time this subset of PCE's was disp
- **QSUSE_TIME** - Wall clock time this subset of PCE's ran when they acquired queue access (\$QSUSE)
- **IOCOUNT** - Total number of I/O's issued by this subset of PCE's
- **CKPT_COUNT** - Number of \$CKPT's issued by this subset of PCE's

\$DPERFDATA(PCESTAT)



```
$HASP660 $DPERFDATA(PCESTAT),PCENAME=NET.SR
$HASP660 PCE PERFORMANCE STATISTICS - INTERVAL=13:49:49.926816,
$HASP660 CPU=8:55.859116,
$HASP660 PCENAME=NET.SR,TIME=43.011997,CPU=40.892083,CPU%=7.63,
$HASP660 QSUSE_TIME=0.277515,IOCOUNT=278356,CKPT_COUNT=7631,
```

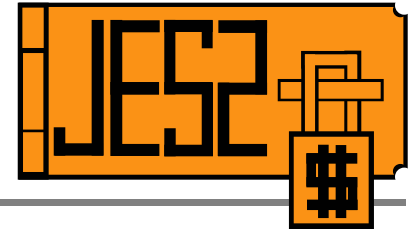
CPU Stats

```
$HASP660 WAIT=IO,MOD=HASPNUC,SEQ=17000000
$HASP660 COUNT=4066,AVGWAIT=0.001505,
$HASP660 POST=IO,COUNT=4066,AVGWAIT=0.001505,
$HASP660 WAIT=BUF,INHIBIT=NO,MOD=HASPNSR,SEQ=70272000
$HASP660 COUNT=4982,AVGWAIT=0.001099,
$HASP660 POST=RESOURCE,COUNT=4970,AVGWAIT=0.000878,
$HASP660 POST=IO,COUNT=12,AVGWAIT=0.092677,
$HASP660 WAIT=CKPT,MOD=HASPNUC,SEQ=28410000
$HASP660 COUNT=221,AVGWAIT=0.342762,CMOD=HASPJQS,CSEQ=03330000,
$HASP660 POST=RESOURCE,COUNT=221,AVGWAIT=0.342762,
```

PCE details

- **WAIT** = wait type(s) passed on the \$WAIT macro
- **MOD/SEQ** = module and sequence number where \$WAIT was issued
- **COUNT** = the number of \$WAITS issued from this location
- **AVGWAIT** = Average time the PCE spent waiting at this location
- **POST** = Post type that woke the PCE up from this \$WAIT
- **AVGWAIT** = Average time PCE waited before being \$Posted
- **NOTES**
 - **INHIBIT=NO** can have multiple POST types
 - **AVGWAIT** for **WAIT=CKPT** entries gives an idea of CKPT access times. **CMOD** and **CSEQ** are the \$QSUSE caller
 - All wait times includes queue time for PCE while it is on ready queue waiting to be dispatched

JES2 CPU Increase Example



Reported Problem: JES2 CPU up suddenly

\$DPERDATA for a 30 minute Interval

```
$HASP660 PCENAME=STAC, TIME=9:05.678529, CPU=5:58.996610, CPU%=95.67,  
$HASP660 QSUSE_TIME=9:01.582558, IOCOUNT=0, CKPT_COUNT=0,  
$HASP660 WAIT=CKPT, MOD=HASPNUC, SEQ=28410000  
$HASP660 COUNT=1653, AVGWAIT=0.756200, CMOD=HASPSTAC, CSEQ=13100000,  
$HASP660 POST=RESOURCE, COUNT=1653, AVGWAIT=0.756200,  
$HASP660 WAIT=STAC, INHIBIT=NO, MOD=HASPSTAC, SEQ=09900000  
$HASP660 COUNT=1646917, AVGWAIT=0.008434,  
$HASP660 POST=RESOURCE, COUNT=1646917, AVGWAIT=0.008434,
```

Key Points

CPU% identifies STAC (Status/Cancel) as likely culprit.

WAIT=STAC is the STAC PCE wait for work.

COUNT with STACNUM=2 on PCEDEF indicates 823,458 SSI requests were made.

AVGWAIT indicates relative rate of the requests.

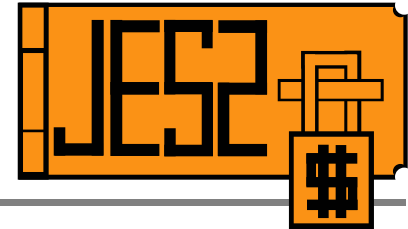
Interesting Points

Time and **CPU** divergence. CPU is roughly 2/3 wall clock time. This implies JES2 is ready to run but is not getting CPU cycles.

CKPT Time

Always interesting to look at the AVGWAIT gives an idea of checkpoint access.

Baseline Comparisons



One Iteration -
XWTR selecting
one dataset

```
$HASP660 PCENAME=PSO,TIME=0.180235,CPU=0.001772,CPU%=0.43,  
$HASP660 WAIT=POST,XECB,MOD=HASPNUC,SEQ=97330800  
$HASP660 COUNT=1,AVGWAIT=0.030135,  
$HASP660 POST=XECB,COUNT=1,AVGWAIT=0.030135,  
$HASP660 WAIT=PSO,MOD=HASPPSO,SEQ=01960000  
$HASP660 COUNT=4,AVGWAIT=3:34.016592,  
$HASP660 POST=RESOURCE,COUNT=4,AVGWAIT=3:34.016592
```

One per dataset
selected

PSONUM=2 posted
twice

PSO Performance
Problem

```
$HASP660 PCENAME=PSO,TIME=2:08.511088,CPU=2:03.548366,CPU%=61.69  
$HASP660 WAIT=POST,XECB,MOD=HASPNUC,SEQ=97330800  
$HASP660 COUNT=74,AVGWAIT=0.000797,  
$HASP660 POST=XECB,COUNT=74,AVGWAIT=0.000797,  
$HASP660 WAIT=PSO,MOD=HASPPSO,SEQ=01960000  
$HASP660 COUNT=235918,AVGWAIT=0.008389,  
$HASP660 POST=RESOURCE,COUNT=235918,AVGWAIT=0.008389,
```

74 datasets processed in $235918/2 = 117,959$ PSO requests.

Throughput Analysis



INTRDR Example

```
PCENAME=INTRDR, TIME=1.022982, CPU=0.721914, CPU%=2.09,
QSUSE_TIME=0.265694, IOCOUNT=8634, CKPT_COUNT=35459,
WAIT=IO, MOD=HASPNUC, SEQ=17000000
COUNT=4303, AVGWAIT=0.002266,
  POST=IO, COUNT=4303, AVGWAIT=0.002266,
WAIT=CKPT, MOD=HASPNUC, SEQ=28410000
COUNT=378, AVGWAIT=0.069000, CMOD=HASPJQS, CSEQ=03330000,
  POST=RESOURCE, COUNT=378, AVGWAIT=0.069000,
WAIT=CKPT, MOD=HASPNUC, SEQ=28410000
COUNT=871, AVGWAIT=0.110514, CMOD=HASPRDR, CSEQ=56716900,
  POST=RESOURCE, COUNT=871, AVGWAIT=0.110514,
WAIT=CKPT, MOD=HASPNUC, SEQ=28410000
COUNT=4, AVGWAIT=0.056268, CMOD=HASPRDR, CSEQ=68547000,
  POST=RESOURCE, COUNT=4, AVGWAIT=0.056268,
WAIT=POST, XECB, MOD=HASPNUC, SEQ=99676000
COUNT=2148, AVGWAIT=0.004109,
  POST=XECB, COUNT=2148, AVGWAIT=0.004109,
WAIT=OPER, XECB, MOD=HASPRDR, SEQ=02844000
COUNT=376, AVGWAIT=27.639311,
  POST=XECB, COUNT=376, AVGWAIT=27.639311,
WAIT=IO, XECB, MOD=HASPRDR, SEQ=18801600
COUNT=1059, AVGWAIT=0.338001,
  POST=XECB, COUNT=1059, AVGWAIT=0.338001,
WAIT=BUF, INHIBIT=NO, MOD=HASPRDR, SEQ=56713500
COUNT=3242, AVGWAIT=0.000763,
  POST=RESOURCE, COUNT=2168, AVGWAIT=0.000750,
  POST=IO, COUNT=1074, AVGWAIT=0.000789
```

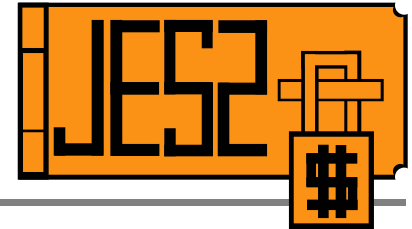
Pool I/O Time

CKPT Access times

Count/2 = number of jobs processed

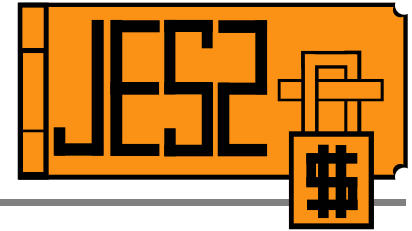
Subtasked SAF response time

JCL buffer receive Rate



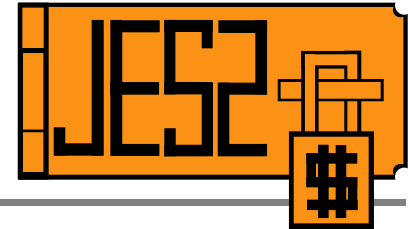
SAPI Debug tools

SAPI?



- **SYSDOUT Application Program Interface**
 - Allows applications access to JES2 spool datasets
- **SSI Function code 79**
- **IAZSSS2**
 - SSOB extension dsect
- **\$SAPID**
 - Main JES2 SAPI control block
 - Resides in JES2SAPI dataspace
- **Common SAPI Issues**
 - SAPI thread not processing sysout datasets
 - SAPI thread not seeing/retrieving all sysout

Tracing SAPI



\$TPCE(SPI),TR=Y ←

Needed for \$SAVE/RETURN tracing

\$TSSI(79),TR=Y ←

\$TTRACEDEF, TABLES=50, LOG=(CLASS=H, SIZE=64000)

\$TTRACEDEF, ACTIVE=Y, LOG=(START=YES)

\$STRACE(28-29) ← /* start the trace

Traces all SAPI calls
cannot filter on asid

Trace ids 28/29 SAPI specific

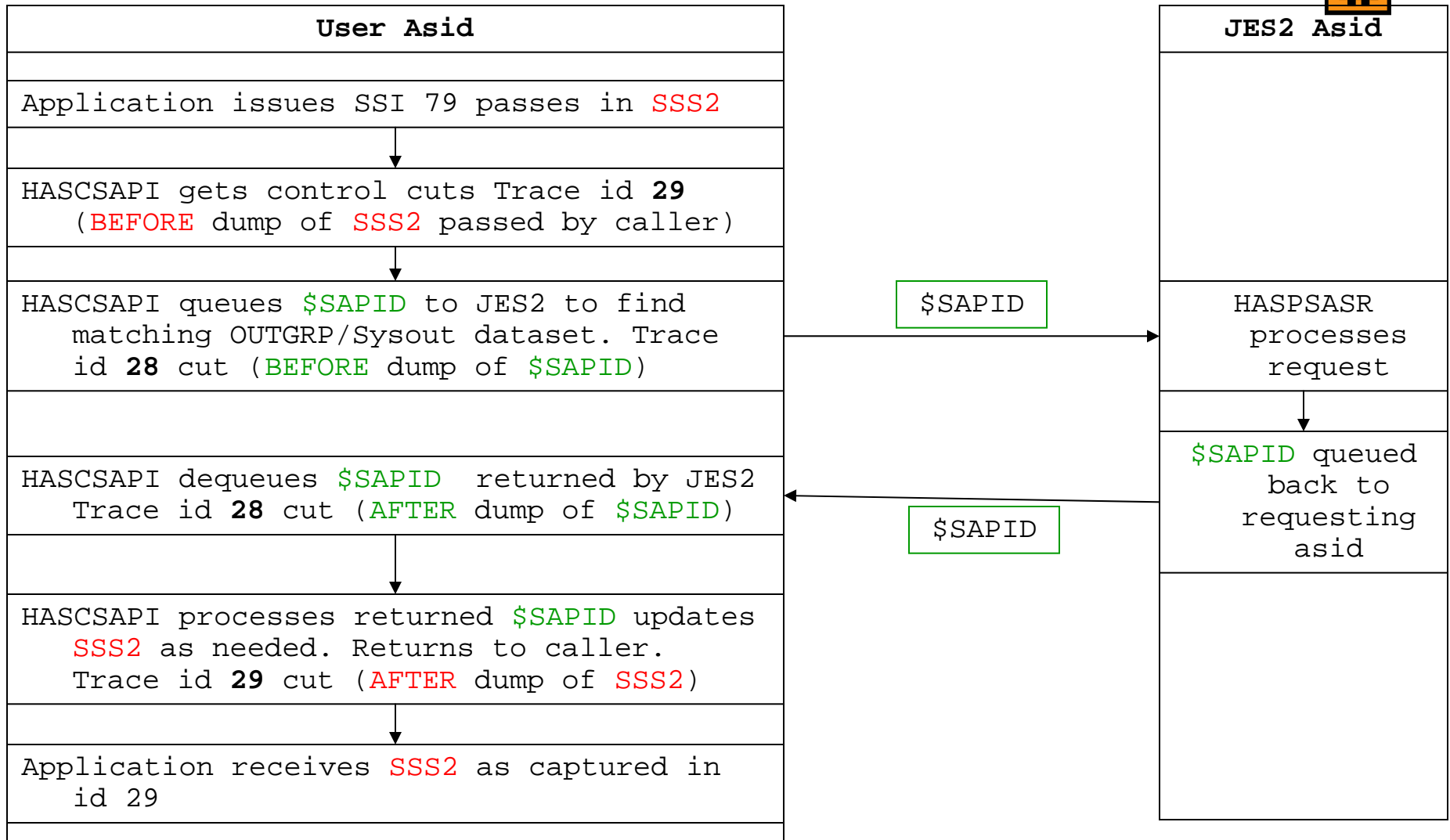
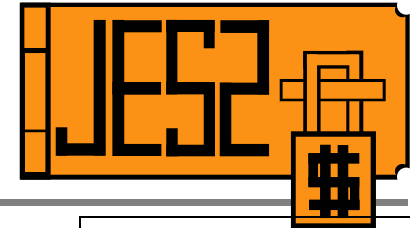
\$PTRACE(28-29) ← /* stop the trace

\$TTRACEDEF, ACTIVE=N, SPIN

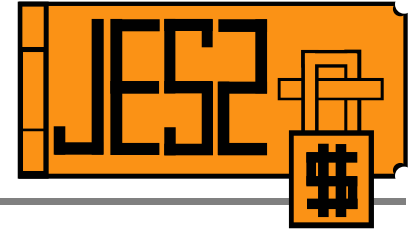
\$TSSI(79), TR=N

\$TPCE(SPI), TR=N

Basic SAPI Trace Flow



Trace id 29 Before



```

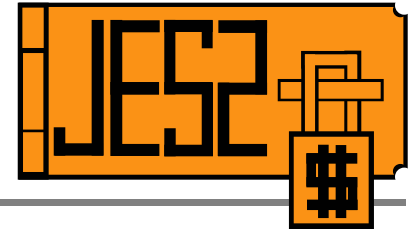
03.55.59.02 ID = 29 SAPISSI ASID 020B
0 00000000 04280200 E2E2E2F2 C1D9E2E8 E2D7C9D5 00000000 00000000 00000000 *.....SSS2ARSPIN.....*
20 00000000 00000000 01000000 7F6010E0 00000000 00000000 000000F5 00000000 *.....-.....5.....*
40 00000000 0000C3C9 D4D9F0F4 F1F3D1F0 F1F0F3F3 4040D1F0 F1F0F3F3 40400000 *.....CIMR0413J01033 J01033 ..*
60 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
80 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
C0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
100 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
120 40404040 40404040 40404040 40404040 40404040 40404040 00000000 00000000 *.....C.....*
140 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
160 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
180 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
1A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
1C0 81000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *a.....*
1E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
200 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
220 000060D0 8000334C 00000000 7FFE99A7 00000000 00000000 00000000 00000000 *..-.....FX.....*
240 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
260 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
280 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
2A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
2C0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
2E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
300 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
320 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
340 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
360 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
380 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
3A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
3C0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
3E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
400 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
420 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*

```



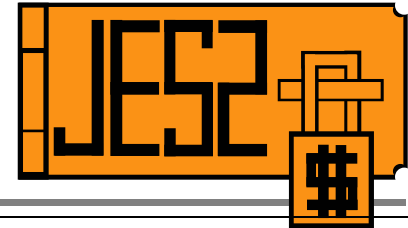
SSS2 Input Area

Trace id 29 Before Fields



- **ASID / BEFORE** - identifies the address space making the request and what follows is the SSS2 as passed to JES2 by the application
- **SSS2VER/LEN/REAS** - start of the capture SSS2 is +4 into the trace entry
- **SSS2TYPE (+28)** - PUT/GET, Count, Bulk Modify (1,2,3)
- **SSS2SEL1 (+3B)** - start of SYSOUT selection flags. The continue to +42 into the trace.
 - X'F5' is filtering sysout on:
 - X'E0' - any OUTDISP HOLD/LEAVE/WRITE/KEEP
 - X'10' - class C
 - X'04' - JOBNAME CIMR0413
 - X'01' - Job Range J01033-J01033
- **SSS2DISP (+1BC)** - sysout disposition flags indicates how completed datasets should be processed by JES2
 - X'81' indicates:
 - X'80' - keep the dataset
 - X'01' - do not show this dataset to this SAPI thread again

Trace id 29 After



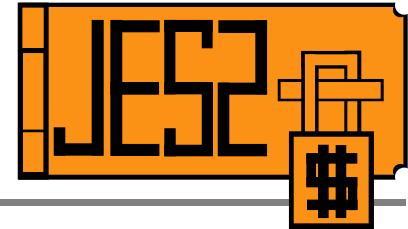
```

03.55.59.01 ID = 29 SAPISSI ASID 020B AFTER -----
 0 00000000 04280200 E2E2E2F2 C1D9E2E8 E2D7C9D5 00000000 00000000 00000000 *.....SSS2ARSYSYPIN.....*
20 00000000 00000000 01000000 7F6010E0 00000000 00000000 000000F0 00000000 *.....-.....0.....*
40 00000000 0000C3C9 D4D9F0F2 F2F0D1F0 F1F0F3F1 4040D1F0 F1F0F3F1 40400000 *.....CIMR0220J01031 J01031 ..*
60 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
80 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
C0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
100 00000000 00000000 00000000 00000000 00000000 C3404040 40404040 40404040 *.....C.....*
120 40404040 40404040 40404040 40404040 40404040 40404040 00000000 00000000 *.....*
140 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
160 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
180 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
1A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
1C0 81000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *a.....*
1E0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
200 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
220 000060D0 8000334C 00000000 7FFE99A7 00010000 00000000 00000000 C3C9D4D9 *.....rx.....CIMR*
240 F0F4F1F3 D1D6C2F0 F1F0F3F3 D1D6C2F0 F1F0F3F3 D1D6C2E3 D9C1C340 00000000 *0413JOB01033JOB01033JOBTRAC ....*
260 00000000 D3C9D5C5 40404040 D3D6C3C1 D3404040 40404040 40404040 40404040 *....LINE LOCAL.....*
280 40404040 4040F3F8 F0F0F140 40404040 40404040 40404040 40404040 4040D1D6 * 38001.....JO.....*
2A0 C2E3D9C1 C34BC3C9 D4D9F0F4 F1F34BD1 D6C2F0F1 F0F3F34B C4F0F0F0 F0F1F0F3 *BTRAC.CIMR0413.JOB01033.D0000103*
2C0 4B6F4040 40404040 40400000 00000000 00000000 00000000 C3000000 00000000 *.. .....C.....*
2E0 00854040 40404040 4040E000 20002000 00000005 00000000 00000000 0000007D *.e .....*'.....*
300 00000000 C3C8D2C4 C1E3C140 C3C9D4D9 F9F4F1F3 E2E8E2E3 E2D7D9E3 00000000 *....CHKDATA CIMR9413SYSTSPRT....*
320 00000000 00000000 00000000 00000000 5C5C5C5C 5C5C5C5C 5C5C5C5C 5C5C5C5C *.....*****.....*
340 F24BF14B F1404040 40404040 40404040 40404040 40404040 40400000 5C5C5C5C *2.1.1.....*****.....*
360 005C5C5C 5C000000 BBD5026D 00000001 00000000 5C5C5C5C 5C5C5C5C 7FFE99CB *....N.....*****.....r.....*
380 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
3A0 00000000 40404040 40404040 40404040 40404040 40404040 40404040 40404040 *....*
3C0 00000000 00000000 00000000 00000000 7FFE9918 C2C3C2E2 D2E24040 C2C3C2E2 *.....r.BCBSKS BCBS*
3E0 D2E24040 000D424E 0104261F C1E2E8E2 40404040 C1E2E8E2 00000000 00000000 *KS ....+....ASYS ASYS.....*
400 00000000 40404040 40404040 00000000 00000000 00000000 00000000 00000000 *....*
420 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*

```

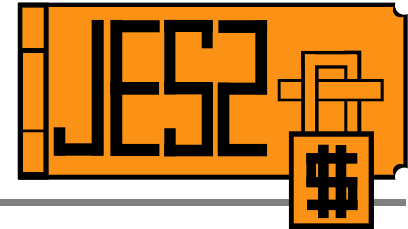
SSS2 Output Area

Trace id 29 After Fields



- **ASID / AFTER** - identifies the address space making the request and what follows is the updated SSS2 being passed back to the application by JES2.
- **SSOBRETN/SSS2REAS** - indicates success/failure of the request
 - In the example both are zeroes so request was satisfied
 - SSOBRETN=4/SSS2REAS=x'F0' means nothing found matching filter criteria
- **SSS2TYPE (+28)** - PUT/GET, Count, Bulk Modify (1,2,3)
- **SSS2DSN (+29E)** - dataset name returned to application on successful PUT/GET call
 - SSOBRETN=4, this will be last successfully selected dataset.
- **SSS2OGNM (+340)** - OUTGRP name associated with the returned dataset
- **SSS2JEST (+220)** - JES Token that uniquely identifies this thread

Trace id 28 Part1



| ID = | 28 | SAPIXM | ASID | 020B | AFTER | ----- |
|------|----------|----------|----------|----------|----------|---------------------------------|
| 0 | 5BE2C1D7 | E0808007 | 00000000 | 00001000 | 04280200 | *SSAP.....SSS2ARSYSPI* |
| 20 | 00000000 | 00000000 | 00000000 | 00000000 | 00000000 | *.....-.....* |
| 40 | 00000000 | 000000F0 | 00000000 | 00000000 | 0000C3C9 | *.....0.....CIMR0220J01031* |
| 60 | 4040D1F0 | F1F0F3F1 | 40400000 | 00000000 | 00000000 | * J01031 |
| 440 | 00000000 | 00000407 | 00000407 | 00000000 | 00000000 | *.....* |
| 460 | 00000000 | 00F25D00 | 0000082C | 00001085 | 007D8200 | *.....2).....e.'b..'b..-.....* |
| 480 | 7F5B4000 | 7F5B5CB0 | 7FFE99A7 | 7FFE9918 | 7FFE99CB | *.\$..\$*..rx..r..r.....* |
| 4A0 | 00001000 | 00000000 | 00000000 | 045D0F06 | 045D0F06 | *.....).....).....).....).....* |
| 4C0 | 0D000D00 | 00000700 | 0F8CB378 | 00000000 | 126FD1F0 | *.....J0.....* |
| 4E0 | 00000000 | 00000000 | 00000000 | 00000000 | 80000000 | *.....C.....* |
| 500 | 20000000 | 08000208 | 00041D68 | 02200000 | 00000000 | *.....* |
| 520 | 00000000 | 00000000 | 00000000 | 045D0F06 | 0D000180 | *.....).....5 |
| 540 | 00010001 | BBD50268 | D1D6C2E3 | D9C1C340 | 00000000 | *.....N..JOBTRAC |
| 560 | 00000000 | 00000F70 | F3F8F0F0 | F1404040 | 5C5C5C5C | *.....38001 |
| 580 | 40404040 | 40404040 | 5C5C5C5C | D3C9D5C5 | 40404040 | *.....***LINE |
| 5A0 | 00000DE6 | 10010000 | 00000000 | 01000000 | 00F90000 | *...W.....9...N...)*.....* |
| 5C0 | 00000000 | 00000000 | C3C9D4D9 | F0F2F2F0 | D1D6C2E3 | *.....CIMR0220JOBTRAC |
| 5E0 | 00000005 | 10000009 | 00040000 | 00000407 | 00010000 | *.....* |
| 600 | FFFFFFF | 80000000 | C300004C | 00000000 | 20024B80 | *.....C.....* |
| 620 | 02200000 | 00000000 | 00000000 | 025CFA06 | 000002DA | *.....*.....* |
| 640 | 045D0F06 | 0D000180 | 00010000 | F5404040 | 40404040 | *.).....5 |
| 660 | D9C1C340 | 00000000 | 01000000 | 4003B0F0 | 0005BDD0 | *RAC |
| 680 | F1404040 | 5C5C5C5C | 5C5C5C5C | 40404040 | 40404040 | *1 |
| 6A0 | D3C9D5C5 | 40404040 | 00000000 | 00000000 | 00000000 | *LINE |
| 6C0 | 00000000 | A8024B80 | 20000000 | 08000208 | 00041D68 | *...y.....* |
| 6E0 | 025CFA06 | 000002DA | 00000000 | 00000000 | 00000000 | *.....* |
| 700 | F5404040 | 40404040 | 00010001 | BBD50268 | D1D6C2E3 | *5 |
| 720 | 4003B0F0 | 0005BDD0 | 00000000 | 00000F70 | F3F8F0F0 | *..0.....38001 |
| 740 | 40404040 | 40404040 | 40404040 | 40404040 | 5C5C5C5C | *.....***LINE |
| 760 | 00000000 | 00000000 | 00000DE6 | 00940085 | 045D1009 | *.....W.m.e.).....C.* |
| 780 | 00010000 | 40404040 | 40404040 | 000088FF | 00000055 | *.....h.....V3800* |
| 7A0 | F1404040 | 5C5C5C5C | 5C5C5C5C | 40404040 | 40404040 | *1 |
| 7C0 | 5C5C5C5C | 5C5C5C5C | 5C5C5C5C | 5C5C5C5C | 5C5C5C5C | *.....* |
| 7E0 | FFFF4800 | 0001F540 | 40404040 | 40400000 | BBD50213 | *.....5 |
| 800 | 00000000 | 40404040 | D9D4E27C | F2E74040 | C3C1F0F7 | *.... RMS@2X CA07RMS RMSRPT * |
| 820 | D3C9D5C5 | 40404040 | 50019052 | 55565555 | 55555555 | *LINE &.....pop.g...* |

SAPSSS2

SAPRETN =
SSOBRETN

SAPWKJOE/SAPCHJOE
(Joe for dataset)

\$JQE of datasets
JOB (SAPJQAR)

SAPWWJOE/SAPWCJOE
Work Joe 1

SAP2WJOE/SAP2CJOE
Work Joe 2

SAPPDDB
\$PDDB for current
dataset

Trace id 28 Part2



```
840 848397B6 8C949615 979697B7 87B71515 8381B0B7 93B68215 9C80B68C 918C1515 *dcp..mo.pop.g...ca..l.b....j...*
860 55555555 55555555 848397B6 8C949615 8381B0B7 93B68215 D1D6C2E3 D9C1C340 *.....dcp..mo.ca..l.b.JOBTRAC *
880 00000000 00000000 00000000 31020428 00000000 00000000 00000000 00000000 *.....*
8A0 00000000 00000000 00000000 04100000 00000000 00000000 00000000 00000000 *.....*
8C0 D1D6C2E3 D9C1C34B C3C9D4D9 F0F2F2F0 4BD1D6C2 F0F1F0F3 F14BC4F0 F0F0F0F1 *JOBTRAC.CIMR0220.JOB01031.D00001*
8E0 F0F24B6F 40404040 40404040 00940085 045D1009 045D100C 00000066 0180C301 *02.. .m.e.)...).C.*
900 00010000 40404040 40404040 000088FF 00000055 00000000 000020E5 F3F8F0F0 *.... .h.....V3800*
920 F1404040 5C5C5C5C 5C5C5C5C 40404040 40404040 00000000 00000000 5C5C5C5C *1 *****
940 5C5C5C5C 5C5C5C5C 5C5C5C5C 5C5C5C5C 5C5C5C5C 00000000 00000000 0000FFFF *.....*
960 FFFF4800 0001F540 40404040 40400000 BBD50213 00000000 00000000 00000000 *.....5 ..N.....*
980 00000000 40404040 D9D4E27C F2E74040 C3C1F0F7 D9D4E240 D9D4E2D9 D7E34040 *.... RMS@2X CA07RMS RMSRPT *
9A0 D3C9D5C5 40404040 50019052 55565555 55555555 55555555 979697B7 87B71515 *LINE &.....pop.g...*
9C0 848397B6 8C949615 979697B7 87B71515 8381B0B7 93B68215 9C80B68C 918C1515 *dcp..mo.pop.g...ca..l.b....j...*
9E0 55555555 55555555 848397B6 8C949615 8381B0B7 93B68215 D1D6C2E3 D9C1C340 *.....dcp..mo.ca..l.b.JOBTRAC *
A00 00000000 00000000 00000000 31020428 00000000 00000000 00000000 00000000 *.....*
A20 00000000 00000000 00000000 04100000 00000000 00000000 00000000 00000000 *.....*
A40 D1D6C2E3 D9C1C34B C3C9D4D9 F0F2F2F0 4BD1D6C2 F0F1F0F3 F14BC4F0 F0F0F0F1 *JOBTRAC.CIMR0220.JOB01031.D00001*
A60 F0F24B6F 40404040 40404040 00000000 00000000 00000000 00000000 00000000 *02.. .....*
A80 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
AA0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 E6E2D740 *.....WSP *
AC0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 B00000FF *.....*
AE0 FFFF0000 000930A0 00093540 00000000 00000000 00000000 00000000 00000000 *.....*
B00 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
B20 00000000 00000000 00000000 00000000 00000000 00000000 00000000 0008D6A8 *.....Oy*
B40 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
B60 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
B80 00000000 00000000 00000000 00000000 00000000 00000000 00000000 C3404040 *.....C *
BA0 40404040 40404040 40404040 40404040 40404040 40404040 40404040 40404040 *.....*
BC0 40000000 8000334C 0000082C 00001085 C1D9E2E8 E2D7C9D5 4BC1D9E2 E8E2D7C9 *.....eARSPIN.ARSPIN*
BE0 D5000D00 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *N.....*
C00 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
C20 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
C40 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
C60 00000000 00000000 040F0000 00000000 000060D0 00000000 00000000 00000000 *.....*
C80 164081B8 4DD8E4C5 E4C5615D 40C2D5C1 D4C56BD9 C1D5C7C5 615D4061 5D40D5C7 * . a.(QUEUE/) BNAME,RANGE/) /) NG*
CA0 C56BD6E4 E3C4C9E2 D7615D40 00000000 00000000 00000000 00000000 00000000 *E,OUTDISP/) *
CC0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
CE0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
D00 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
D20 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
D40 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 *.....*
D60 E8E2D7C9 D5000000 8000334C C8F900F0 ←BBB516CC 9DAE74A5 *YSPIN.....H9.0.N.....v *
```

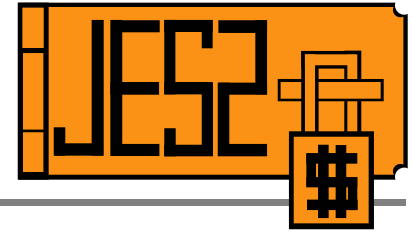
SAPPDDB2 \$PDDB for
lookaheaddataset

SAPWSP \$WSP or work
selection criteria
for last
successful put/get

SAP#SKIP/SAP#PDDB

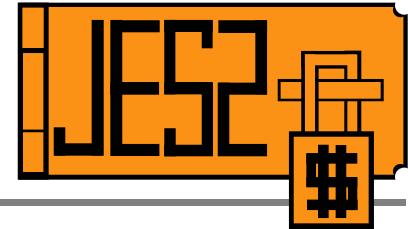
SAPREAS becomes SSS2REAS

Trace id 28 Key Fields (After)



- **SAPRETN** – will become the **SSOBRETN**
 - non-zero indicates HASPSASR detected condition
- **SAPREAS** – will become the **SSS2REAS**
 - Valid when SAPRETN is non-zero
- **SAP#SKIP** - number of datasets skipped for SAF failures in the current **OUTGRP**
- **SAP#Pddb** – number of datasets processed in the current

SAPI Trace tidbits



- Trace id 28/29's can be intermixed
 - All SAPI requests traced
 - Use ASID/SSS2JEST to match pairs if needed
- Trace id 28 before/after pair
 - Only present when JES2 maintask service required such as:
 - New JOE/OUTGRP needed
 - Dataset(s) within an OUTGRP need to be split out
- Consecutive trace id 29 before/after pairs
 - When SSOBRETN=0 this implies that the datasets within a single JOE are being processed
 - SSS2DSN will be changing on the AFTER entry
- Add trace ids 20,30 to the \$STRACE command
 - 20 is \$#GET which traces a threads attempts to find work to do
 - 30 is \$#POST which traces JES2 device types posted when work becomes available
 - Very useful when the problem is the thread is not selecting work