

Session E35

# IMS Debugging in the 64-bit World

Jeff Maddix  
maddix@us.ibm.com  
(408)463-4956



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# IMS Debugging in a 64-Bit World - Regarding this Presentation

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**This procedure is intended to help systems programmers diagnose IMS  
This presentation documents information that is Diagnosis Information  
provided by IMS.**

**Attention: Do not use this Diagnosis Information as a programming  
interface.**

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# IMS Debugging in a 64-Bit World Agenda

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## ▲ Agenda

- **Section 1: 64-Bit Terminology**
- **Section 2: Recognizing z/Architecture in Dumps**
- **Section 3: MVS Formatting Changes**
- **Section 4: IMS Formatting Changes**
- **Section 5: IMS z/Architecture Related APARs**
- **Section 6: Verify Buffers Backed Above the Bar**

## **Section 1: 64-Bit Terminology**

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# **Section 1: 64-Bit Terminology**

# Hardware Terminology

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## ▲ New hardware terminology

- Unofficial prerelease term "Freeway"
- z900 series of processors
  - Constraint relief for workloads limited by 2GB real storage
  - Supports both ESA/390 and 64-bit z/Architecture
- Device Type
  - D/T2064
    - ▶ Actual keyword used in RETAIN database to describe this hardware

# Software Terminology

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## ▲ New software terminology

- **z/Architecture**
  - 64-bit Architecture
- **z/Architecture Mode**
  - IPL with ARCHLVL 2 in LOADxx SYS1.PARMLIB member
  - Default for z/OS systems
- **Extended Addressing Mode or 64-bit Addressing Mode**
  - Addressing mode may be entered via:
    - ▶ SAM64, LPSWE, stacking PC/PR, BASM/BSM, Interruptions
    - ▶ See z/Architecture Principles of Operation
      - ◆ Document Number SA22-7832-00

## Software Terminology, Cont.

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### △ Software Terminology, Cont.

- "Above the Bar"
  - Reference to storage above 2GB
- ESAME
  - Enterprise Systems Architecture Modal Extensions
  - This term is obsolete and replaced by z/Architecture but you may spot it used in system control blocks and in some messages

# 64-Bit Operating Systems

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## ▲ 64-bit operating systems

- 64-Bit Capable Operating Systems

- OS/390 V2R10

- ▶ Minimum release to run in 64-Bit z/Architecture mode

- ▶ IPL with ARCHLVL 2 in LOADxx SYS1.PARMLIB member

- z/OS V1R1

- ▶ GA March 2001

- z/OS V1R4

- ▶ GA September 2002

- z/OS V1R5

- ▶ Planned availability 1Q04



## Section 2: Recognizing z/Architecture in Dumps

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### Section 2:

# Recognizing z/Architecture in Dumps

# IPCS with OS/390 R10 and Above

▲ OS/390 R10 and above dump datasets may not be used with IPCS for OS/390 R9 and below

- Dump prefix for OS/390 R10 dumps and above will contain DR2 if browsed

```

BROWSE      IMSDUMP.X010718.Y093138.SJFEVMX.MADDIX      Browse subst
Command ==> _____ Scroll ==
***** Top of Data *****
DR2 H ..... 37 ..... 0 ..... IEAVTSDT
DR2 CV ..... 37 ..... 0 ..... ÷.
DR2 CV ..... 37 ..... 0 .....
DR2 CV ..... û^ ..... 37 ..... 0 ..... û^ .
DR2 CV ..... û{ ..... 37 ..... 0 ..... ûA..
    
```

- Dump prefix for OS/390 R9 dumps and below will contain DR1 if browsed

```

BROWSE      IMSDUMP.X010621.Y095758.SJFEVMX.MADDIX      Browse subs
Command ==> _____ Scroll ==
***** Top of Data *****
DR1 H ..... î! ..... 0 ..... IEAVTSDT
DR1 CV ..... î! ..... 0 ..... aâK8
DR1 CV ..... æ- ..... î! ..... 0 ..... 0 .....
DR1 CV ..... æø ..... î! ..... 0 ..... 0 ..... TQE....
DR1 CV ..... æ° ..... î! ..... 0 ..... 0 .....
    
```

## IPCS with OS/390 R10 and Above Continued...

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- ▲ If an OS/390 R10 dump is initialized under OS/390 R9 or below, it will fail initialization

```
IKJ56650I TIME-12:44:45 PM. CPU-00:00:05 SERVICE-627819 SESSION-00:12:17 SEPTE  
BER 13,2001
```

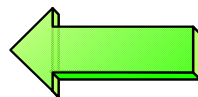
```
BLS18122I Initialization in progress for DSNAME('IMSDUMP.X010718.Y093138.SJFEV  
X.MADDIX')
```

```
BLS18123I 65,142 blocks, 270,990,720 bytes, in DSNAME('IMSDUMP.X010718.Y093138  
SJFEVMX.MADDIX')
```

```
IKJ56650I TIME-12:46:21 PM. CPU-00:00:05 SERVICE-987319 SESSION-00:13:52 SEPTE  
BER 13,2001
```

```
BLS18104I Symbol CVT not found
```

```
***
```




# IPCS with OS/390 R10 and Above Continued...

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- ▲ If a pre-OS/390 R10 dump is initialized under OS/390 V2R10 and above, it will initialize, but IPCS commands will encounter errors.

- IPCS ANALYSIS STATUS error example:

```
IPCS OUTPUT STREAM ----- Line 0 Cols
Command ==> _                SCROLL ==>
***** TOP OF DATA *****
BLS01000I Contention data initialization is in progress
IAR80302I Primary RSM data area failed validity checks. RSM processing
IEF10001I No device group contention
IOS10107I IOQ at 00F67B00 does not point to UCB at 00F33278
Control block IOSB      at 00FC412C failed acronym check
```




## Use Same release of IPCS when possible

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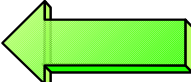
- ▲ Dump initialization message BLS18223I tells you the z/OS level starting in z/OS 1.2
- ▲ Message BLS21001I tells you the level of IPCS being used

```
BLS18122I Initialization in progress for DSNAME('IMSDUMP.X020805.Y120942.PM7196
BLS18124I TITLE=IMS6 FOR IBM
BLS18223I Dump written by z/OS 01.02.00 SVC dump - level differs from IPCS level
BLS21001I IPCS for z/OS 01.04.00
BLS18222I ESA mode system
```



## Recognizing the MVS Level

▲ Select Option 1 (BROWSE) from the IPCS Primary Option Menu

```
----- IPCS PRIMARY OPTION MENU -----  
OPTION ==> 1_   
  
0  DEFAULTS      - Specify default dump and options      * USERID  
1  BROWSE        - Browse dump data set                  * DATE  
2  ANALYSIS      - Analyze dump contents                  * JULIAN  
3  UTILITY        - Perform utility functions              * TIME  
4  INVENTORY     - Inventory of problem data              * PREFIX  
5  SUBMIT         - Submit problem analysis job to batch   * TERMINAL  
6  COMMAND       - Enter subcommand, CLIST or REXX exec   * PF KEYS  
T  TUTORIAL      - Learn how to use the IPCS dialog        *  
X  EXIT          - Terminate using log and list defaults  *  
*****
```

Enter END command to terminate IPCS dialog

# Recognizing the MVS Level Continued...

---

▲ Hit <Enter> to advance to IPCS Pointers Panel

```
----- IPCS - ENTRY PANEL -----  
Command ==>  
  
CURRENT DEFAULTS:  
  Source ==> DSNAME('IMSDUMP.X020805.Y120942.PM71967.M030776')  
  Address space ==> ASID(X'0001')  
  
OVERRIDE DEFAULTS:                                     (defaults used for blank fields)  
  Source ==> DSNAME('IMSDUMP.X020805.Y120942.PM71967.M030776')  
  Address space ==>  
  Password      ==>  
  
POINTER:  
  Address      ==>                                     (blank to display pointer stack)  
  Remark       ==>                                     (optional text)
```

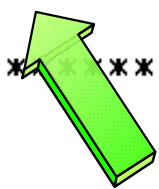
# Recognizing the MVS Level Continued...

▲ Enter line command: S

```

DSNAME (' IMSDUMP.X020805.Y120942.PM71967.M030776') POINTERS -----
Command ==>                                SCROLL ==> CSR
ASID(X'0001') is the default address space
PTR   Address  Address space                               Data type
-----
s0001 00000000 ASID(X'0038')                               AREA
Remarks:
***** END OF POINTER STACK *****

```





# Recognizing the MVS Level Continued...

▲ Enter Command: L CVT

```

ASID(X'0038') STORAGE -----
Command ==> L CVT  ← CMD
00000000  040C0000  814000E0  00000000  00000000
00000010  00FC97C0  00000000  070E0000  00000000
00000020  070C0000  85652522  070C4000  8566CE3A
00000030  00000000  00000000  070E0000  00000000
00000040  00000000  00000000  00000000  00FC97C0
00000050  00000000  00000000  040C0000  8134A8C0
00000060  040C0000  80FFE280  00080000  808A61E0
00000070  00080000  BD27D788  040C0000  813E2E80
00000080  00000000  00001005  00020038  00060011
00000090  00002001  00010000  00000000  00000000
000000A0  0C000000  013F2808  00000000  00000000
000000B0  00000000  00000000  00010965  02F5B638
000000C0  18000000  00000000  00000000  00000000
000000D0  00000000  15B05000  00000000  00000000
000000E0.:019F.--All bytes contain X'00'

          _ SCROLL ==> CSR
          - a \.....
          .p{.....
          .e.....e...
          .....
          .....p{
          .....a.y{
          .....S...../\
          .....Ph...a...
          .....
          .....
          .....5..
          .....
          .....&.....
    
```

# Recognizing the MVS Level Continued...

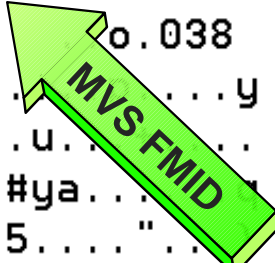
▲ Enter Command: L CVT

```

ASID(X'0001') STORAGE -----
Command ==> _
00FC9798          E2D7F74B      F04BF240
00FC97A0      C8C2C2F7      F7F0F540      40404040      40404040
00FC97B0      40404040      40404040      00009672      F0F3F840
00FC97C0      00000218      00FE393C      00FC973C      00FC9DA8
00FC97D0      00000000      00FD80A4      00FEBA4E      00FE0338
00FC97E0      00FE016C      01797BA8      81283B20      00FE1D98
00FC97F0      02F70540      00FDF570      0102217F      00FC9DD0
00FC9800      00F3F000      00FEF5E8      00FE3960      00000000
00FC9810      0A0307FE      00FC9744      00FC9590      00000000
00FC9820      40C3E5E3      00FCACC0      00FD9FB2      00FD9FD2
00FC9830      00F3FE30      9BFCCF58      00000000      00FD4C10
00FC9840      00000000      81449CC0      00FE3810      017AA1E8
00FC9850      85314000      00FC9DD0      00FE7E60      00D53140
00FC9860      00000000      7FFFFFFF      00000000      00000000
00FC9870      00FC9EA8      0000A320      00FDE880      00FC9778
00FC9880      00FC9EE0      80F941E8      00FC8DB0      D3000000
00FC9890      00000000      0A0D0A06      00000000      00FC8CD8
00FC98A0      013BDBF8      03140F44      00FDF7C0      00FC7498
00FC98B0      00000000      00000000      00F41B78      00FC9D10
    
```

```

SCROLL ==> CSR
          SP7.0.2
HBB7705
          o.038
          .....y
          .....u.....
          ...%.`#ya...
          .7. .5...."....
          .30...5Y...-....
          .....p...n.....
          CVT...{.....K
          .3.....<.
          ....a..{.....:~Y
          e. ....}..=-.N.
          .....
          ...y..t...Y...p.
          ...\.9.Y....L...
          .....Q
          ...8.....7{...q
          .....4.....
    
```



# Recognizing the MVS Level Continued...

## ▲ MVS Release to FMID relationship

OS/390 V2R8	HBB6608
OS/390 V2R9	JBB6609
OS/390 V2R10	HBB7703
z/OS 1.1	JBB7713
z/OS 1.2	HBB7705
z/OS 1.3	HBB7706
z/OS 1.4	HBB7707

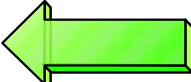
**Note: Starting with z/OS 1.1, the last 3 digits add up to the release**

**HBB7705 ==> 7+0+5 = 12 ==> z/OS 1.2**

# Recognizing the Device Type

## D/T 2064

▲ Select Option 1 (BROWSE) from the IPCS Primary Option Menu

```
----- IPCS PRIMARY OPTION MENU -----  
OPTION ==> 1_   
  
0  DEFAULTS      - Specify default dump and options      * USERID  
1  BROWSE        - Browse dump data set                  * DATE  
2  ANALYSIS     - Analyze dump contents                 * JULIAN  
3  UTILITY      - Perform utility functions             * TIME  
4  INVENTORY    - Inventory of problem data             * PREFIX  
5  SUBMIT       - Submit problem analysis job to batch  * TERMINAL  
6  COMMAND      - Enter subcommand, CLIST or REXX exec  * PF KEYS  
T  TUTORIAL     - Learn how to use the IPCS dialog      *  
X  EXIT         - Terminate using log and list defaults *  
*****
```

Enter END command to terminate IPCS dialog

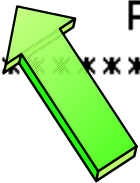
# Recognizing the Device Type D/T 2064

▲ Enter line command: S

```

DSNAME('IMSDUMP.X010712.Y133100.SJFEVMX.MADDIX') POINTERS -----
Command ==>                                     SCROLL ==> CSR
ASID(X'0001') is the default address space
PTR  Address  Address space  Data type
S0001 00000000 ASID(X'00B8') AREA
Remarks:
***** END OF POINTER STACK *****

```



# Recognizing the Device Type

## D/T 2064

### ▲ Enter Command: L\_CVT+42C?

```

ASID(X'00B8') STORAGE -----
Command ==> L_CVT+42C?  ← CMD
                                SCROLL ==> CSR
00000000  000A0000  000130E1  00000000  00000000  | ..... |
00000010  00FD1B18  00000000  00000000  00000000  | ..... |
00000020.:2F.--All bytes contain X'00'
00000030  00000000  00000000  470C0000  A1E7E9EE  | .....~XZ. |
00000040  00000000  00000000  00000000  00FD1B18  | ..... |
00000050  00000000  00000000  000A0000  000140E1  | ..... |
00000060  000A0000  000150E1  000A0000  000160E1  | .....&.....-. |
00000070  000A0000  000170E1  000A0000  000180E1  | ..... |
00000080  00000000  00001005  00020001  00040016  | ..... |
00000090  00000002  00000000  00000000  00000000  | ..... |
000000A0  00000001  0133D108  00000000  0078B000  | .....J..... |
000000B0  00000000  00000000  0001369E  01F589E0  | .....5i\ |
000000C0  28000000  00000000  E0000000  00000000  | .....\..... |
000000D0.:012F.--All bytes contain X'00'
00000130  47041000  80000000  00000000  0A4282E2  | .....bS |
00000140  47851400  80000000  00000000  21CF0A66  | .e..... |
00000150  44040000  80000000  00000000  0134AE14  | ..... |
00000160.:016F.--All bytes contain X'00'
00000170  07060000  00000000  00000000  00000000  | ..... |
    
```

# Recognizing the Device Type D/T 2064

- ▲ You will see the machine information here at the CVTHID area
  - The device type can be found at offset x'1C'

```

ASID(X'0001') STORAGE -----
Command ==> _
016F2728          00000396    012064B6
016F2730    0478E100    00000000    00000000    00001800
016F2740    0003F0F0    F2F0F6F4    F1C3F5C9    C2D4F0F2
016F2750    F0F0F0F0    F0F0F0F4    F0F0F0F0    FFF00000
016F2760    C9D6E2E5    E2D9C3D2    F0F261F2    F661F0F1
016F2770    E4E6F7F7    F9F1F440    00000000    00000000
016F2780.:016F27AF.--All bytes contain X'00'
016F27B0    00000000    00000000    C9D6E2E5    C9E2C4E3
016F27C0    F0F261F2    F661F0F1    E4E6F7F7    F9F1F440
016F27D0    00081018    20283038    C9D6E2E5    C3C8D9C2
016F27E0    F0F261F2    F661F0F1    E4E6F7F7    F9F1F440
016F27F0    C3C8D9C2    00000000    00000000    00000000
016F2800    00000000    016F2820    00000000    81100BE8
016F2810    00000000    00000080    00000000    00000000
016F2820    E2D9C240    016F284C    00000000    00000000
016F2830.:016F283F.--All bytes contain X'00'
016F2840    00000000    00000000    00000000    E2D9C240
016F2850    016F2878    00000000    00000000    00000000
016F2860.:016F286F.--All bytes contain X'00'

```

SCROLL ==> CSR

```

...o...
.....
..0020641C5IBM02
0000040000.0..
IOSVSR02/26/01
UW77914.....
.....IOSVISDT
02/26/01UW77914
.....IOSVCHRB
02/26/01UW77914
CHRB.....
.....?.....a..Y
.....
SRB .?<.....
.....SRB
.?......

```

# Recognizing z/Architecture Mode IPL - Globally with CVT

▲ Enter Command: CBF CVT

```

----- IPCS PRIMARY OPTION MENU -----
OPTION  ==> IP CBF CVT_  ← CMD
0  DEFAULTS      - Specify default dump and options
1  BROWSE        - Browse dump data set
2  ANALYSIS      - Analyze dump contents
3  UTILITY       - Perform utility functions
4  INVENTORY     - Inventory of problem data
5  SUBMIT        - Submit problem analysis job to batch
6  COMMAND       - Enter subcommand, CLIST or REXX exec
T  TUTORIAL      - Learn how to use the IPCS dialog
X  EXIT          - Terminate using log and list defaults

*****
* USERID   - M030776
* DATE     - 01/07/15
* JULIAN   - 01.196
* TIME     - 12:54
* PREFIX   - M030776
* TERMINAL - 3278
* PF KEYS  - 24
*****

```

Enter END command to terminate IPCS dialog



# Recognizing z/Architecture Mode IPL - Globally with CVT

▲ Enter Command: F FLAG3

```

IPCS OUTPUT STREAM ----- Line 0 Cols 1 78
Command ==> F FLAG3_          SCROLL ==> CSR
***** TOP OF DATA *****
CVT: 00FD1B18
-0028  PRODN.... SP6.1.0    PRODI.... HBB7703    VERID....
-0006  MDL..... 2064      RELNO.... 038
+0000  TCBP.... 00000218   0EF00.... 00FF1064   LINK..... 00FD4C7C
+000C  AUSCB.... 00FD2100   BUF..... 00000000   XAPG..... 00FE40A0
+0018  OVL00.... 00FF534E   PCNVT.... 00FDD030   PRLTV.... 00FDCE64
+0024  LLCB.... 0170C3F0   LLTRM.... 8118D620   XTLER.... 00FDB1B8
+0030  SYSAD.... 01FDE418   BTERM.... 00FDEAE8   DATE..... 0101172F
+003C  MSLT.... 00FCF0A8   ZDTAB.... 00F38000   XITP..... 00FF76B8
+0048  0EF01.... 00FF1088   VSS..... 0000      VPSM..... 0000
+0050  EXIT.... 0A03      BRET.... 07FE      SVDCB.... 00FD4C84
+0058  TPC..... 00FD2128   ICPID.... 0000      CVT..... 40C3E5E3
+0064  CUCB.... 00FCCC70   QTE00.... 00FEF182   QTD00.... 00FEF1A2
+0070  STB..... 00F496E0   DCB..... 9B       DCBA.... FD7438
+0078  SV76M.... 00000000   IXAVL.... 00FDD2D8   NUCB.... 00000000
+0084  FBOSV.... 8136FEE0   ODS..... 00FF0F38   ECVT.... 016E9B58
+0090  DAIRX.... 8A124000   MSER.... 00FCF0A8   OPT01.... 00FEA5B0
    
```



# Recognizing z/Architecture Mode IPL

## - Globally with CVT

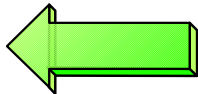
▲ FLAG3, CVT+x'17A' = x'80' bit is set if IPLed in z/Architecture Mode

```

IPCS OUTPUT STREAM ----- FOUND: LINE 39 C
Command ==>                                SCROLL ==>
+0174 SYLK..... 00          SLID..... 000000          FLAG1.... 7E
+0179 FLAG2.... F8          FLAG3.... 80          ← IPLed in z/Arch Mode
+017C RT03..... 00FDED38    VLDWT.... 00000000    EXSNR.... 0118F6B8
+018C EXSNL.... 00          SPVLK.... 00          CTLFG.... 10
+018F APG..... 00          TRACE.... 07FB        TRAC2.... 07FB
+0194 RSCN..... 00FF0EB4    TAS..... 00000000    TRCRM.... 8B7B3BF8
+01A0 SHRVM.... 00800000    OVLO1.... 00FF5348    PPGMX.... 811915A8
+01AC GRSST.... 00          GVT..... 00FD35F0    ASCRF.... 021E4E00
+01B8 ASCRL.... 082F0200    PUTL..... 80DB8A3C    SRBRT.... 00FF0EF0
+01C4 OLTOA.... 00FD25B0    SMFEX.... 00FD2610    CSPIE.... 88A85A10
+01D0 PTGT..... 80DB8A42    SIGPT.... 1E          SPDMC.... 00
+01D6 DSSAC.... 00          STCK..... 80DB8A36    MAXMP.... 0007
+01DE BSM2..... 0B02        SCAN..... 80DC4000    AUTHL.... 7FFFF001
+01E8 BLDCP.... 00FDF220    GETCL.... 00FDF4E0    FRECL.... 00FDF670
+01F4 DELCP.... 00FDF828    CRMN..... 00FF7A6C    CRAS.... 81191A50
+0200 QSAS..... 812A2D3E    FRAS..... 81191A72    S1EE.... 00FF0D44
+020C PARS..... 80DB8A24    QUIS..... 01192D30    STXU.... 8A01BFF0
+0218 OPTE.... 00FD85E6    SDRM..... 8A04C000    CSRT.... 016F4EB8
+0224 AQTOP.... 016F6EB8    VVMDI.... 00000833    ASVT.... 00F9F0D0
    
```

# Recognizing z/Architecture Mode IPL - Using PSA

▲ Select Option 1 (BROWSE) from the IPCS Primary Option Menu

```
----- IPCS PRIMARY OPTION MENU -----  
OPTION ==> 1_   
  
0  DEFAULTS      - Specify default dump and options      * USERID  
1  BROWSE        - Browse dump data set                  * DATE  
2  ANALYSIS     - Analyze dump contents                 * JULIAN  
3  UTILITY       - Perform utility functions             * TIME  
4  INVENTORY    - Inventory of problem data            * PREFIX  
5  SUBMIT       - Submit problem analysis job to batch * TERMINAL  
6  COMMAND      - Enter subcommand, CLIST or REXX exec * PF KEYS  
T  TUTORIAL    - Learn how to use the IPCS dialog      *  
X  EXIT         - Terminate using log and list defaults *  
*****
```

Enter END command to terminate IPCS dialog

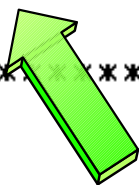
# Recognizing z/Architecture Mode IPL - Using PSA

▲ Enter Line Command: S

```

DSNAME('IMSDUMP.X010712.Y133100.SJFEVMX.MADDIX') POINTERS -----
Command ==>                                     SCROLL ==> CSR
ASID(X'00B8') is the default address space
PTR   Address  Address space                               Data type
-----
s0001 00000000 ASID(X'00B8')                     AREA
Remarks:
***** END OF POINTER STACK *****

```



# Recognizing z/Architecture Mode IPL - Using PSA

▲ PSA+x'A3' = x'01' bit is set if IPLed in z/Architecture Mode

ASID (X'0001')	STORAGE	-----			SCROLL ==>	CSR
Command ==>						
00000000	000A0000	000130E1	00000000	00000000	.....	
00000010	00FD1B18	00000000	00000000	00000000	.....	
00000020.:2F.	--All bytes contain X'00'					
00000030	00000000	00000000	470C0000	A1E7E9EE	.....~XZ.	
00000040	00000000	00000000	00000000	00FD1B18	.....	
00000050	00000000	00000000	000A0000	000140E1	.....	
00000060	000A0000	000150E1	000A0000	000160E1	.....&.....-	
00000070	000A0000	000170E1	000A0000	000180E1	.....	
00000080	00000000	00001005	00020001	00040016	.....	
00000090	00000002	00000000	00000000	00000000	.....	
000000A0	00000001	00000000	00000000	0078B000	.....J.....	
000000B0	00000000	00000000	0001369E	01F589E0	.....5i\	
000000C0	28000000	00000000	E0000000	00000000	.....\ .....	
000000D0.:012F.	--All bytes contain X'00'					
00000130	47041000	80000000	00000000	0A4282E2	.....bS	
00000140	47851400	80000000	00000000	21CF0A66	.e.....	
00000150	44040000	80000000	00000000	0134AE14	.....	
00000160.:016F.	--All bytes contain X'00'					
00000170	07060000	00000000	00000000	00000000	.....	



# Recognizing z/Architecture Mode IPL - Using Formatted PSA

## ▲ PSA formatted using Command: IP CBF PSA<sub>n</sub>

- PSA AMDID at offset x'A3', x'01' bit is set if IPLed in z/Architecture Mode

```
IPCS OUTPUT STREAM ----- Line 0 Cols 1 78
Command ==> IP CBF PSA0_          SCROLL ==> CSR
***** TOP OF DATA *****
```

PSA: 00000000

+0010	CVT.....	00FCF098	CVT2.....	00FCF098	EPARM....	00000000
+0084	CPUAD....	0003	EICODE...	1202	SDATA....	00020030
+008C	PDATA....	00060011	PINFO....	00000000	MCNUM....	0000
+0096	PERCODE..	0000	PER.....	00000000	00000000	
+00A0	AID.....	0C	PERAID...	00	OPACID...	00
+00A3	AMDID....	01				
+00A8	TEID.....	00000000	00002001			
+00B0	MONCODE..	00000000	00000000		SSID.....	000101AF
+00BC	IOINTP...	00EF5A28	IOINTID..	28000000	PCFETO...	00000000
+00C8	FACLIST..	E0000000	MCIC.....	00000000	00000000	
+00F0	MCICE....	00000000	EDCODE...	00000000		
+00F8	FSA.....	00000000	00000000			
+0120	ROPSW....	00000000	00000000	00000000	00000000	
+0130	EOPSW....	07040000	80000000	00000000	04222D68	
+0140	SOPSW....	07040000	80000000	00000000	0421C182	
+0150	POPSW....	07044000	80000000	00000000	04223E62	



# Recognizing z/Architecture Mode IPL - Dump Initialization

---

- △ z/OS 1.1 and below MSG BLS18222I will state "ESAME mode system" if z/Architecture Mode IPL
- △ z/OS 1.2 and higher MSG BLS18222I will state "z/Architecture mode system" if z/Architecture Mode IPL
- △ MSG BLS18222I will state "ESA mode system" if ARCHLVL 1, ESA mode IPL

```
IKJ56650I TIME-07:18:51 PM. CPU-00:00:04 SERVICE-489060 SESSION-49:35:09 JULY 14, 2001
BLS18122I Initialization in progress for DSNAME('IMSDUMP.X010712.Y133100.SJFEVMX.MADDIX')
BLS18124I TITLE=JOBNAME SERVICEA STEPNAME SERVICEASERVICEA SYSTEM 0C4
BLS18222I ESAME mode system
BLS18123I 21,800 blocks, 90,688,000 bytes, in DSNAME('IMSDUMP.X010712.Y133100.SJFEVMX.MADDIX')
IKJ56650I TIME-07:19:08 PM. CPU-00:00:04 SERVICE-615601 SESSION-49:35:26 JULY 14, 2001
BLS18058I Warnings regarding STRUCTURE(PVT) at ASID(X'0001') FFA2A0:
BLS18059I Located via STRUCTURE(CVT) at ASID(X'0001') FD1B18
BLS18300I Storage not in dump
***
```



IPLed in z/Arch Mode

## Section 3: MVS Formatting Changes

---

# Section 3: MVS Diagnostic Changes



# MVS Diagnostic Changes - Overview

---

## ▲ MVS Diagnostic Changes

- **Hardware Changes reflected in MVS formatting**
  - 128-bit PSW
  - 64-bit GPRs
  - 64-bit CRs
  - 8K PSA
  - Central storage to 128 GB
    - ▶ `x'20_00000000'`
      - ◆ Note that `_` (underscore) is used to separate 64-bit addresses



# z/Architecture PSW Format, Cont.

▲ PSA at address x'00000000' in address space showing 128-bit PSWs

ASID(X'0001')	STORAGE	-----			SCROLL ==>	CSR
Command ==>						
00000000	000A0000	000130E1	00000000	00000000	.....	
00000010	00FD1B18	00000000	00000000	00000000	.....	
00000020	.:2F.--All bytes contain X'00'					
00000030	00000000	00000000	470C0000	A1E7E9EE	.....~XZ.	
00000040	00000000	00000000	00000000	00FD1B18	.....	
00000050	00000000	00000000	000A0000	000140E1	.....	
00000060	000A0000	000150E1	000A0000	000160E1	.....&.....-	
00000070	000A0000	000170E1	000A0000	000180E1	.....	
00000080	00000000	00001005	00020001	00040016	.....	
00000090	00000002	00000000	00000000	00000000	.....	
000000A0	00000001	0133D108	00000000	0078B000	.....J.....	
000000B0	00000000	00000000	0001369E	01F589E0	.....5i\	
000000C0	28000000	00000000	E0000000	00000000	.....\ .....	
000000D0	.:12F.--All bytes contain X'00'					
00000130	47041000	80000000	00000000	0A4282E2	.....bS	
00000140	47851400	80000000	00000000	21CF0A66	.e.....	
00000150	44040000	80000000	00000000	0134AE14	.....	
00000160	.:016F.--All bytes contain X'00'					
00000170	07060000	00000000	00000000	00000000	.....	

## z/Architecture PSW Format, Cont.

---

### ▲ z/Architecture PSWs from PSA:

• PSA+x'130', EOPSW: 47041000 80000000 00000000 0A4282E2

– ESA PSW = 470C1000 8A4282E2

• PSA+x'140', SOPSW: 47851400 80000000 00000000 21CF0A66

– ESA PSW = 478D1400 A1CF0A66

• PSA+x'150', POPSW: 44040000 80000000 00000000 0134AE14

– ESA PSW = 440C0000 8134AE14

▲ MVS converts the 128-bit z/Architecture PSW to a 64-bit ESA/390-like PSW in most control blocks

# z/Architecture Mode PSW Example

▲ 64-bit mode PSW example:

- PSA+x'130', EOPSW: 04045001 80000000 00000000 2A4282E2
- ESA/390 PSW = 040C5001 AA4282E2

▲ PSW Bit 31 and 32 Chart:

Bit-31	Bit-32t	Addressing Mode
0	0	24-bit
0	1	31-bit
1	1	64-bit
1	0	Specification Exception (PIC 6)

# TCB/RB Formatting Changes

▲ Select option 6 (COMMAND) from the IPCS Primary Option Menu

```

----- IPCS PRIMARY OPTION MENU -----
OPTION  ==> 6_  ←
0  DEFAULTS      - Specify default dump and options
1  BROWSE        - Browse dump data set
2  ANALYSIS      - Analyze dump contents
3  UTILITY       - Perform utility functions
4  INVENTORY     - Inventory of problem data
5  SUBMIT        - Submit problem analysis job to batch
6  COMMAND       - Enter subcommand, CLIST or REXX exec
T  TUTORIAL      - Learn how to use the IPCS dialog
X  EXIT          - Terminate using log and list defaults

*****
* USERID      - M030776
* DATE        - 01/07/15
* JULIAN      - 01.196
* TIME        - 21:53
* PREFIX      - M030776
* TERMINAL    - 3278
* PF KEYS    - 24
*****
    
```

Enter END command to terminate IPCS dialog

# TCB/RB Formatting Changes

## ▲ Issue Command: SUMMARY FORMAT

----- IPCS Subcommand Entry -----  
 Enter a free-form IPCS subcommand or a CLIST or REXX exec invocation below:

==> SUMMARY FORMAT\_ 

----- IPCS Subcommands and Abbreviations -----

ADDDUMP	DROPDUMP, DROPD	LISTMAP, LMAP	RUNCHAIN, RUNC
ANALYZE	DROPMAP, DROPM	LISTSYM, LSYM	SCAN
ARCHECK	DROPSYM, DROPS	LISTUCB, LISTU	SELECT
ASCBEXIT, ASCBX	EQUATE, EQU, EQ	LITERAL	SETDEF, SETD
ASMCHECK, ASMK	FIND, F	LPAMAP	STACK
CBFORMAT, CBF	FINDMOD, FMOD	MERGE	STATUS, ST
CBSTAT	FINDUCB, FINDU	NAME	SUMMARY, SUMM
CLOSE	GTFTRACE, GTF	NAMETOKN	SYSTRACE
COPYDDIR	INTEGER	NOTE, N	TCBEXIT, TCBX
COPYDUMP	IPCS HELP, H	OPEN	VERBEXIT, VERBX
COPYTRC	LIST, L	PROFILE, PROF	WHERE, W
CTRACE	LISTDUMP, LDMP	RENUM, REN	

# TCB/RB Formatting Changes

▲ Issue Command: F 'TCB: '

- Repeat the find until the failing TCB is found vis TCB CMP field

```

IPCS OUTPUT STREAM ----- Line 0 Cols 1 78
Command ==> F 'TCB: ' _ ← CMD SCROLL ==> CSR
***** TOP OF DATA *****
COULD NOT ACCESS PSA      AT 00F8A000
COULD NOT ACCESS PSA      AT 00FBD000
COULD NOT ACCESS PSA      AT 00FB6000
COULD NOT ACCESS PSA      AT 00FAE000
    
```

\* \* \* \* F O R M A T \* \* \* \*

GLOBAL SERVICE MANAGER QUEUE  
 QUEUE IS EMPTY

LOCAL SERVICE MANAGER QUEUE  
 QUEUE IS EMPTY



# TCB/RB Formatting Changes

IPCS OUTPUT STREAM ----- Line 3394 Cols 1 78  
 Command ==> SCROLL ==> CSR

TCB: 007C92E8

+0000	RBP.....	007FD6C0	PIE.....	00000000	DEB.....	007970CC	
+000C	TIO.....	007B4000	CMP.....	840C4000	PLGS.....	00000000	
+0018	MSS.....	7F73F250	PKF.....	80	LLS.....	01000000	00
+0022	LMP.....	FF	DSP.....	FF			
+0028	JLB.....	007C9558	JPQ.....	007933F0			

Register values

0-3	0A460E1C	0078EF58	085A1018	7F696580
4-7	007C8000	00000000	00000001	7F696EB0
8-11	7F696990	00FBFA30	0078E000	0226F206
12-15	0A460E1C	0078EF78	50DB5F28	00EB18C0

64-Bit GPRs from TCB/STCB


0-1	00000000_0A460E1C	00000000_0078EF58
2-3	00000000_085A1018	00000000_7F696580
4-5	00000000_007C8000	00000000_00000000
6-7	00000000_00000001	00000000_7F696EB0
8-9	00000000_7F696990	00000000_00FBFA30
10-11	00000000_0078E000	00000000_0226F206
12-13	00000000_0A460E1C	00000000_0078EF78
14-15	00000000_50DB5F28	FFFFFFFF_00EB18C0

64-Bit GPRs are included with TCB Formatting


# TCB/RB Formatting Changes

▲ Enter Command: F RB:

- This will take you to the first RB. Note the RBP field so you know when to stop

IPCS OUTPUT STREAM ----- Line 3393 Cols 1 78  
 Command ==> F RB: \_  SCROLL ==> CSR

TCB: 007C92E8

+0000	RBP.....	007FD6C0		00000000	DEB.....	007970CC
+000C	TIO.....	007B4000	CMP.....	840C4000	TRN.....	00000000
+0018	MSS.....	7F73F250	PKF.....	80	FLGS.....	01000000 00
+0022	LMP.....	FF	DSP.....	FF	LLS.....	007933D0
+0028	JLB.....	007C9558	JPQ.....	007933F0		

Register values

0-3	0A460E1C	0078EF58	085A1018	7F696580
4-7	007C8000	00000000	00000001	7F696EB0
8-11	7F696990	00FBFA30	0078E000	0226F206
12-15	0A460E1C	0078EF78	50DB5F28	00EB18C0

64-Bit GPRs from TCB/STCB

0-1	00000000_0A460E1C	00000000_0078EF58
2-3	00000000_085A1018	00000000_7F696580
4-5	00000000_007C8000	00000000_00000000
6-7	00000000_00000001	00000000_7F696EB0
8-9	00000000_7F696990	00000000_00FBFA30

# TCB/RB Formatting Changes

## - Error RB

IPCS OUTPUT STREAM ----- FOUND: LINE 4092 COL 3  
 Command ==> F RB: \_ Used to find next RB  
 SCROLL ==> CSR

PRB: 007FE020

-0020	XSB.....	7FFFE10	FLAGS2...	80	RTPSW1...	478D0000
-0014		800EA39A	RTPSW2...	00040004	00000000	
-0008	FLAGS1...	02000004	WLIC.....	00040004		
+0000	RSV.....	00000000	00000000		SZSTAB...	00110082
+000C	CDE.....	007FAF08	OPSW.....	478D0000	800EA39A	
+0018	SQE.....	00000000	LINK.....	007C92E8		
+0020	GPR0-3...	FD000056	00006FA8	00000040	007D2CD4	
+0030	GPR4-7...	007D2CB0	007FAD90	007B3FF8	FD000000	
+0040	GPR8-11..	007FAF88	007F6108	00000000	007FAD90	
+0050	GPR12-15.	00E8F85A	00006F58	80E8FE2E	007FAFB8	

64-Bit GPRs from the RB/XSB

0-1	00000001_FD000056	00000000_00006FA8
2-3	00000000_00000040	00000000_007D2CD4
4-5	00000000_007D2CB0	00000000_007FAD90
6-7	00000000_007B3FF8	00000000_FD000000
8-9	00000000_007FAF88	00000000_007F6108
10-11	00000000_00000000	00000000_007FAD90
12-13	00000000_00E8F85A	00000000_00006F58
14-15	00000000_80E8FE2E	00000000_007FAFB8

64-Bit GPRs are included with the RB Formatting here. These registers are from the time the RB was first given control. Registers at the time of the interrupt are in the next RB. Enter "F RB:" to find those registers

# TCB/RB Formatting Changes - Registers for Error RB

IPCS OUTPUT STREAM ----- Line 4148 Cols 1 78

Command ==> F RB:  CMD SCROLL ==> CSR

SVRB: 007FD5C8

-0020	XSB.....	7FFFC2B0	FLA...	00	RTPSW1...	00000000
-0014		00000000	RTPSW2	00000000	00000000	
-0008	FLAGS1...	220...	WLIC....	00020033		
+0000	RSV.....	00000000	00000000		SZSTAB...	001ED022
+000C	CDE.....	00000000	OPSW....	470C1000	8A583446	
+0018	Q.....	00000000	LINK....	007FE020		
+0020	GPR0-3...	00000000	00121AD5	00121088	00000000	
+0030	GPR4-7...	000E87B0	00121088	21E95498	40404040	
+0040	GPR8-11..	FFFFFF0F0	000ADC38	000E77B0	000E95BE	
+0050	GPR12-15.	000E773C	0002CB30	800EA02C	00000000	

64-Bit GPRs from the RB/XSB

Left halves of all registers contain zeros

0-3	00000000	00121AD5	00121088	00000000
4-7	000E87B0	00121088	21E95498	40404040
8-11	FFFFFF0F0	000ADC38	000E77B0	000E95BE
12-15	000E773C	0002CB30	800EA02C	00000000

Note that the 64-bit GPRs are the same as the 32-bit GPRs and the left halves are not presented if they contain zeros. These are the registers from the time of the interrupt in the prior RB - in this case, the prior interrupt was an ABEND0C4 program check

# TCB/RB Formatting Changes

## - Last RB in the TCB/RB Flow

▲ This is the last RB in the TCB/RB flow

- TCBRBP from the TCB+x'00" contained 007FD6C0

IPCS OUTPUT STREAM ----- Line 4198 Cols 1 78  
 Command ==> SCROLL ==> CSR

SVRB: 007FD6C0



-0020	XSB.....	7FFFC3A8	FLAGS2...	00	RTPSW1...	478C0000
-0014		8A42C45A	RTPSW2...	00020004	00000000	
-0008	FLAGS1...	02000000	WLIC.....	0002000C		
+0000	RSV.....	00000000	00000000		SZSTAB...	001ED022
+000C	CDE.....	00000000	OPSW.....	470C1000	8A45FAE2	
+0018	Q.....	00000000	LINK.....	007FD5C8		
+0020	GPR0-3...	81323EE8	7FF871B0	7F6B2518	7F73ACEC	
+0030	GPR4-7...	00F68540	0A58371F	8A582720	00F68580	
+0040	GPR8-11..	7F696EB0	000007B0	085A1018	0078CFC0	
+0050	GPR12-15.	7F73AB80	7F73AB80	085A1018	00000000	

64-Bit GPRs from the RB/XSB

Left halves of all registers contain zeros

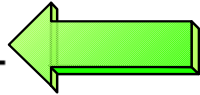
0-3	81323EE8	7FF871B0	7F6B2518	7F73ACEC
4-7	00F68540	0A58371F	8A582720	00F68580
8-11	7F696EB0	000007B0	085A1018	0078CFC0
12-15	7F73AB80	7F73AB80	085A1018	00000000

# IPCS STATUS Output

▲ Select Option 2 (ANALYSIS) from the IPCS Primary Option Menu

```
----- IPCS PRIMARY OPTION MENU -----
OPTION  ==> 2_
0  DEFAULTS      - Specify default dump and options
1  BROWSE        - Browse dump data set
2  ANALYSIS      - Analyze dump contents
3  UTILITY       - Perform utility functions
4  INVENTORY     - Inventory of problem data
5  SUBMIT        - Submit problem analysis job to batch
6  COMMAND       - Enter subcommand, CLIST or REXX exec
T  TUTORIAL      - Learn how to use the IPCS dialog
X  EXIT          - Terminate using log and list defaults

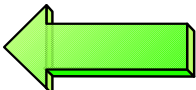
*****
* USERID      - M030776
* DATE        - 01/07/16
* JULIAN      - 01.197
* TIME        - 10:17
* PREFIX      - M030776
* TERMINAL    - 3278
* PF KEYS     - 24
*****
```



Enter END command to terminate IPCS dialog

# IPCS STATUS Output

▲ Select Option 2 (STATUS) from the IPCS Analysis Menu

```
----- IPCS MVS ANALYSIS OF DUMP CONTENTS -----
OPTION ==> 2_ 
```

To display information, specify the corresponding option number.

1	SYMPTOMS	- Symptoms	*****
2	STATUS	- System environment summary	* USERID - M030776
3	WORKSHEET	- System environment worksheet	* DATE - 01/07/16
4	SUMMARY	- Address spaces and tasks	* JULIAN - 01.197
5	CONTENTION	- Resource contention	* TIME - 10:22
6	COMPONENT	- MVS component data	* PREFIX - M030776
7	TRACES	- Trace formatting	* TERMINAL- 3278
			* PF KEYS - 24
			*****

Enter END command to terminate MVS dump analysis.

# IPCS STATUS Output

▲ You will now see the output from the STATUS formatter

```

IPCS OUTPUT STREAM ----- Line 0 Cols 1 78
Command ==> _                SCROLL ==> CSR
***** TOP OF DATA *****

```

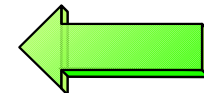
## SYSTEM STATUS:

```

Nucleus member name: IEANUC01
I/O configuration data: Not Available
Sysplex name: RETEST
TIME OF DAY CLOCK: B6044DE4 00A5EE64 06/21/2001 00:54:06.598750 local
TIME OF DAY CLOCK: B6048388 E9A5EE64 06/21/2001 04:54:06.598750 GMT
Program Producing Dump: SYSMDUMP
Program Requesting Dump: #UNKNOWN

```

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



## SEARCH ARGUMENT ABSTRACT



# IPCS STATUS Output

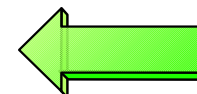
▲ The Diagnostic Data Report summarizes the error information

```
IPCS OUTPUT STREAM ----- Line 15 Cols 1 78
Command ==> _                SCROLL ==> CSR
                * * * DIAGNOSTIC DATA REPORT * * *
```

## SEARCH ARGUMENT ABSTRACT

RIDS/#UNKNOWN#L RIDS/#UNKNOWN AB/S00C4 PRCS/00000004 REGS/0E36E REGS/0BDDC

Symptom	Description
-----	-----
RIDS/#UNKNOWN#L	Load module name: #UNKNOWN
RIDS/#UNKNOWN	Csect name: #UNKNOWN
AB/S00C4	System abend code: 00C4
PRCS/00000004	Abend reason code: 00000004
REGS/0E36E	Register/PSW difference for ROE: 36E
REGS/0BDDC	Register/PSW difference for ROB: DDC



SERVICEABILITY INFORMATION NOT PROVIDED BY THE RECOVERY ROUTINE

# IPCS STATUS Output

▲ The Time of Error Information is also provided in the output

```
IPCS OUTPUT STREAM ----- Line 40 Cols 1 78
Command ==> _                SCROLL ==> CSR
Time of Error Information
```

```
PSW: 478D0000 800EA39A   Instruction length: 04   Interrupt code: 0004
Failing instruction text: 926C92E8 30005850 92204140
```

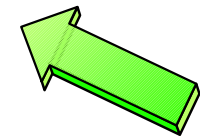
Registers 0-7

```
GR: 00000000 00121AD5 00121088 00000000   000E87B0 00121088 21E95498 40404040
AR: 00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000
```

Registers 8-15

```
GR: FFFFFFF0 000ADC38 000E77B0 000E95BE   000E773C 0002CB30 800EA02C 00000000
AR: 00000000 00000000 00000000 00000000   00000000 00000000 00000000 00000000
```

```
Home ASID: 00B8      Primary ASID: 00B8      Secondary ASID: 00B8
PKM: 00C0           AX: 0016                EAX: 0000
```



The registers would have been 64-bit if PSW was in 64-bit mode

```
RTM was entered because of a program check interrupt.
The error occurred while an enabled RB was in control.
No locks were held.
No super bits were set.
```

STATUS FROM THE RB WHICH ESTABLISHED THE ESTAE EXIT

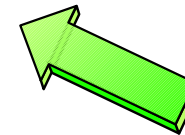
# IPCS STATUS Output

IPCS OUTPUT STREAM ----- Line 92 Cols 1 78  
 Command ==> \_ SCROLL ==> CSR

## General purpose register values

Left halves of all registers contain zeros

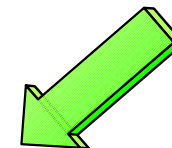
0-3	00000000	00121AD5	00121088	00000000
4-7	000E87B0	00121088	21E95498	40404040
8-11	FFFFFF0F0	000ADC38	000E77B0	000E95BE
12-15	000E773C	0002CB30	800EA02C	00000000



## Access register values

0-3	00000000	00000000	00000000	00000000
4-7	00000000	00000000	00000000	00000000
8-11	00000000	00000000	00000000	00000000
12-15	00000000	00000000	00000000	00000000

The registers can be found in their extended form at the end of the IPCS STATUS output



## Control register values

0-1	00000000_5F29FE50	00000001_ADBDC003
2-3	00000000_615F7D80	00000000_00C000B8
4-5	00000000_001600B8	00000000_01E58E00
6-7	00000000_FE000000	00000001_ADBDC003
8-9	00000000_00000000	00000000_20000000
10-11	00000000_20A0E158	00000000_20A0FFFE
12-13	00000000_7C7B5F0F	00000001_ADBDC003
14-15	00000000_DF881E53	00000000_7F6E9010

# MVS System Trace Table

▲ Please note that the display of PSWs in the system trace table is not consistent. Some displayed PSWs are S390-like while others display bit-12 off.

```

IPCS OUTPUT STREAM -----
Command ==> IP SYSTRACE ASID(x'116')_                SCROLL ==> CSR
005A9A68 00
03-0116 005ACA68 DSP      070C0000 AB1C00B0 00000000 005ACA68 00598298
03-0116 005ACA68 SVC      23 07741000 80111FD8 80111FD8 00000000 005ACA68 00598298
03-0116 005ACA68 SVC      78 07040000 841C1064 0000E500 00000000 005ACA68 00598298
03-0116 005ACA68 SVCR     78 070C0000 841C1064 00000000 00000000 005ACA68 00598298
03-0116 005ACA68 SVC      78 07042000 841C1190 0000E500 00000000 005ACA68 00598298
03-0116 005ACA68 SVCR     78 070C2000 841C1190 00000000 00000000 005ACA68 00598298
03-0116 005ACA68 SVC      38 07040000 841C3876 00000000 00000000 005ACA68 00598298
03-0116 005ACA68 PC        ... 0 01291EEC
03-0116 005ACA68 PT        ... 0 0129123C
03-0116 005ACA68 SVCR     38 070C1000 841C3876 00000000 00000000 01400116
03-0116 005ACA68 SVC       B 07042000 841C13EC 00000000 00000000 00000002
03-0116 005ACA68 SVCR     B 070C2000 841C13EC 00000000 18185560 0101198F
03-0116 005ACA68 PGM     011 070C2000 841C3D56 00040011 00585000

03-0116 005ACA68 SVC      3C 07041000 841C3E10 841C3D10 00000100 00585B70
03-0116 005ACA68 SVCR     3C 070C1000 841C3E10 00000000 00000000 00585B70
03-0116 005ACA68 PGM     011 070C2000 83DE29D4 00040011 00586000
    
```

The hardware PSW bit-12 is actually off in z/Architecture mode

## **Section 4: IMS Formatting Changes**

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# **Section 4: IMS Formatting Changes**

# IMS Formatting Changes

---

## **Section 5: IMS z/Architecture Related APARs**

---

# **Section 5: IMS z/Architecture Related APARs**

## z/Architecture Related IMS APARs

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- ▲ IMS will include keyword "64BITIMS" in APARs that involve z/Architecture software or hardware changes



## **z/Architecture Related IMS APARs, Continued**

---

### **▲ ABEND0D3 PIC x'13' on LRA (Load Real Address) instruction**

**– PQ41295/UQ48302 - R510 PDO 0045 ESO F011**

**– PQ42408/UQ48303 - R610 PDO 0045 ESO F011**

**– PQ42409/UQ48304 - R710 PDO 0046 ESO F011**

- In the z/Architecture environment, when pageable storage is getmained, it can be backed anywhere in real storage. The LRA instruction cannot handle translation of the 64-bit real address. If bits 0-32 of the real address are not all zeros, a special-operation exception is recognized.**
- TPROT instruction substituted to check if page is loaded**

## **z/Architecture Related IMS APARs, Continued**

---

- ▲ ABEND0C4 in DFSRCP30 due to accessing PSA data in z/Architecture mode. Also could result in overlay of CSA.**
  - PQ42981/UQ48747 - R510 PDO 0048 ESO F011**
  - PQ42917/UQ48701 - R610 PDO 0048 ESO F011**
  - PQ42937/UQ48746 - R710 PDO 0048 ESO F011**
- This failure was recognized in z/Architecture mode because the layout of the PSA has changed. What was a high value in ESA/390 mode, is a low value in z/Architecture mode. In ESA/390 mode, an invalid length was used rather harmlessly. Not so in z/Architecture mode.**

## **z/Architecture Related IMS APARs, Continued**

---

### **▲ BPE Dump formatting access problems**

- PQ44349/UQ50125 - R710 PDO 0103 ESO F101 - CQS**
- PQ44351/UQ50529 - R110 PDO 0105 ESO F102 - IMS Connect**
- PQ44351/UQ50244 - R110 PDO 0103 ESO F101 - ORS**
- OS/390 V2R10 and above IPCS changes affected the EVALSYM function which now returns a 16 byte value instead of an 8 byte value. Formatting fails when a dump formatting option is attempted.**

## **z/Architecture Related IMS APARs, Continued**

---

**▲ IMS V7 CQS loop calling IXLMG with ABEND0C4s in module IXLA1MG filling  
SYS1.LOGREC**

**– PQ45860/UQ51962 - R710 PDO 0110 ESO F103**

- Users affected are those with more than two links defined between the machine on which CQS is running and any coupling facility containing a CQS list structure, or**
- Both the machine on which CQS is running and any coupling facility containing a CQS list structure or D/T2064 with any number of links.**

## **z/Architecture Related IMS APARs, Continued**

---

### **▲ Performance problems with Log Archive utility used on D/T2064 zSeries processor**

- PQ48811/UQ54912 - R510 PDO 0125 ESO F106**
- PQ46887/UQ54046 - R610 PDO 0120 ESO F105**
- PQ48050/UQ54047 - R710 PDO 0121 ESO F105**
- The IMS Log Archive Utility contains numerous instances of variables defined in close proximity to instructions that modify them. If the distance between variable and instruction is less than the amount of cached storage for instruction prefetch, the modification invalidates the cache, causing it to be refreshed.**
- Local subroutine variables have been moved to the general data area.**

## z/Architecture Related IMS APARs, Continued

---

### ▲ 64-bit exploitation for OSAM and Logger

- PQ42127/UQ52990 **PE** - R710 PDO 0121 ESO F105
- PQ52887/UQ59347 - Log Data Loss During /ERE
- PQ60202/UQ67132 - Various Control Region Abends and Waits
- Buffers for OSAM databases and for IMS logs are page fixed in real storage above the 2GB bar if IPLed in z/Architecture mode.
- Virtual storage for these buffers remain below the 2GB bar and operate in 31-bit mode.

## z/Architecture Related IMS APARs, Continued

---

### ▲ Emergency Restart Ignores WADS Data when not Running in z/Architecture Mode

– PQ52887/UQ59347 - R710 PDO 0144 ESO F111

- **ERROR DESCRIPTION:** Users may lose log data during emergency restart. Restart will ignore WADS data when closing the OLDS. It reads the WADS but decides that the data is residual. (Exclusion: If DFS0616I OLDS BUFFERS SUCCESSFULLY PURGED is received at previous execution of XRF capable system).
- **USERS AFFECTED:** All IMS R710 Users with PEd APAR/PTF PQ42127/UQ52990 (64-bit exploitation for OSAM and Logger - PDO 0121 ESO F105) installed and not running in z/Architecture mode.
- **RECOMMENDATION:** Install corrective PTF.

## z/Architecture Related IMS APARs, Continued

---

▲ Various IMS control region abends and waits when running in z/Architecture mode PEd APAR/PTF PQ42127/UQ52990

– PQ60202/UQ67132 - R710 PDO 0227 ESO F207

- **ERROR DESCRIPTION:** IMS Control region ABENDU0403 in DFSAOS70, wait for I/O completion DFSAOS80, ABEND0C4 IOSVIRBA DFSAOS70, ABENDS0D3 after application termination. Due to problems with construction of CCW chains because of size changes resulting in overlays.
- **USERS AFFECTED:** All IMS R710 Users with PEd APAR/PTF PQ42127/UQ52990 (64-bit exploitation for OSAM and Logger - PDO 0121 ESO F105) installed and running in z/Architecture mode
- **RECOMMENDATION:** Install corrective PTF.



## **z/Architecture Related IMS APARs, Continued**

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- ▲ **64-bit exploitation for fastpath buffer pool**
  - **PQ51419/UQ62396 - R710 PDO 0218 ESO F204 - PE**
  - **PQ62953/UQ68629 - R710 PDO 0233 ESO F208**
- **IMS fastpath buffer pool exploitation of 64-bit real storage**
- **Virtual storage for these buffers remain below the 2GB bar and operate in 31-bit mode. LOC=(31,64) for IMODULE GETMAIN**

## z/Architecture Related IMS APARs, Continued

---

### ▲ ABEND0D3 RC13 IN DFSVSPL0 +X'57E' WHEN OPENING VSO PRELOAD AREA.

– PQ57983/UQ64591 - R610 PDO 0219 ESO F205

– PQ58447/UQ64726 - R710 PDO 0216 ESO F204

- **ERROR DESCRIPTION:** The algorithm for page fixing the pages of the dataspace as the UOWs are processed fails. LRA instruction receives the ABEND0D3 RC13.
- **USERS AFFECTED:** IMSFP DEDB VSO running z/OS or S/390 R10 ARCHLVL=2 in z/Architecture mode
- **RECOMMENDATION:** Install corrective PTF.

## z/Architecture Related IMS APARs, Continued

---

### ▲ ABENDU0403 IN DFSAOS70 AT +X'4C2' WHEN RUNNING 64-BIT

– PQ57234/UQ64497 - R710 PDO 0214 ESO F204

- **ERROR DESCRIPTION:** ABENDU0403 because global IOMA does not match local IOMA. Global IOMA pointer to local IOMA is overlaid with IDAL control blocks
- **USERS AFFECTED:** All IMS710 users of OSAM data bases in z/Architecture mode
- **RECOMMENDATION:** Install corrective PTF.

## z/Architecture Related IMS APARs, Continued

---

### ▲ ABENDU0403 IN DFSAOS70 AT +X'4C2' WHEN RUNNING 64-BIT

– PQ57234/UQ64497 - R710 PDO 0214 ESO F204

- **ERROR DESCRIPTION:** ABENDU0403 because global IOMA does not match local IOMA. Global IOMA pointer to local IOMA is overlaid with IDAL control blocks
- **USERS AFFECTED:** All IMS710 users of OSAM data bases in z/Architecture mode
- **RECOMMENDATION:** Install corrective PTF.

## **z/Architecture Related IMS APARs, Continued**

---

### **▲ 64-bit exploitation for OSAM sequential buffers**

- PQ52333/UQ\_\_\_\_\_ - R710 PDO \_\_\_\_\_ ESO F\_\_\_\_\_**
- IMS sequential buffering exploitation of 64-bit real storage.**
- Virtual storage for these buffers remain below the 2GB bar and operate in 31-bit mode**

# **z/Architecture Related IMS APARs, Continued**

---

## **▲ MVS Virtual/Real Paging in z/Architecture Mode**

- Recommendation to stay as current as possible with z/OS maintenance**
- Use Enhanced Holddata to keep abreast of this maintenance**
  - <http://service.software.ibm.com/390holddata.html>**
- IMS has experienced invalid page substitutions while running in z/Architecture mode resulting in IMS outages**

## **Section 6: Verify Buffers Backed Above the Bar**

---

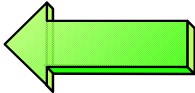
### **Section 6:**

# **Verify Buffers Backed Above the Bar**

# Finding "Above the Bar" Log Buffers

▲ Select Option 2 (ANALYSIS) from the IPCS Primary Option Menu

```

----- IPCS PRIMARY OPTION MENU -----
OPTION  ==> 2_ 
0  DEFAULTS      - Specify default dump and options
1  BROWSE        - Browse dump data set
2  ANALYSIS      - Analyze dump contents
3  UTILITY       - Perform utility functions
4  INVENTORY     - Inventory of problem data
5  SUBMIT        - Submit problem analysis job to batch
6  COMMAND       - Enter subcommand, CLIST or REXX exec
T  TUTORIAL     - Learn how to use the IPCS dialog
X  EXIT          - Terminate using log and list defaults


*****
*  USERID   - M030776
*  DATE     - 01/07/18
*  JULIAN   - 01.199
*  TIME     - 12:59
*  PREFIX   - M030776
*  TERMINAL- 3278
*  PF KEYS  - 24
*****
    
```

Enter END command to terminate IPCS dialog



## Finding "Above the Bar" Log Buffers

▲ Select Option 6 (COMPONENT) from the IPCS Analysis Menu

```
----- IPCS MVS ANALYSIS OF DUMP CONTENTS -----  
OPTION ==> 6_ 
```

To display information, specify the corresponding option number.

1	SYMPTOMS	- Symptoms	*****
2	STATUS	- System environment summary	* USERID - M030776
3	WORKSHEET	- System environment worksheet	* DATE - 01/07/18
4	SUMMARY	- Address spaces and tasks	* JULIAN - 01.199
5	CONTENTION	- Resource contention	* TIME - 13:06
6	COMPONENT	- MVS component data	* PREFIX - M030776
7	TRACES	- Trace formatting	* TERMINAL- 3278
			* PF KEYS - 24
			*****

Enter END command to terminate MVS dump analysis.

## Finding "Above the Bar" Log Buffers

### ▲ Select DFSAAMPR from the IPCS Component Analysis Menu

```
----- IPCS MVS DUMP COMPONENT DATA ANALYSIS -----
OPTION ==>                                     SCROLL ==> CSR
```

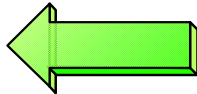
To display information, specify "S option name" or enter S to the left of the option desired. Enter ? to the left of an option to display help regarding the component support.

S	Name	Abstract
_	COUPLE	XCF Coupling analysis
_	CTRACE	Component trace summary
_	DAE	DAE header data
_	DATA	DB2 analysis
<u>s</u>	DFSAAMPR	IMS Interactive Dump Formatter
_	DIVDATA	Data in virtual storage
_	DLFDATA	Data Lookaside Facility data
_	DLFTRACE	Data Lookaside Facility trace
_	ELXDATA	IMS Transport Manager Formatting
_	GRSDATA	ENQ/DEQ resources
_	IOSCHECK	Active input/output requests
_	IPCSDATA	IPCS control data
_	IRLM	IMS Resource Lock Manager analysis

## Finding "Above the Bar" Log Buffers

### ▲ Select option 0 (INIT) from the IMS Dump Formatting Primary Menu

```

----- IMS DUMP FORMATTING PRIMARY MENU -----
OPTION  ==> 0_ 

```

0	INIT	- IMS formatting initialization and content summary	
1	BROWSE	- Browse Dump dataset (IPCS norm)	*****
2	HI-LEVEL	- IMS Component level formatting	*USERID - M030776
3	LOW-LEVEL	- IMS ITASK level formatting	*DATE - 01/07/18
4	ANALYSIS	- IMS dump analysis	*JULIAN - 01.199
5	USER	- IMS user formatting routines	*TIME - 13:15
6	OTHER COMP	- Other IMS components (BPE, CQS...)	*PREFIX - M030776
7	OTHER PROD	- Other IMS-related products	*TERMINAL- 3278
E	EDA	- IMS Enhanced Dump Analysis	*PF KEYS -
T	TUTORIAL	- IMS dump formatting tutorial	*****
X	EXIT	- Exit IMS dump formatting	

Enter END or RETURN command to terminate IMS component formatting.  
Use PFKeys to scroll up and down if needed.

```

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```

## Finding "Above the Bar" Log Buffers

### ▲ Initialize with the correct IMS JOBNAME in the CTL field

```
----- IMS DUMP CONTENT STATUS AND CONTROL -----
COMMAND ==>
```

Enter the IMS CTL/BATCH or DL/I jobname to cause the IMS symbols to be set for this dump. Request subsystem list for possible IMS names.

N <==== IMS SUBSYSTEM LIST DESIRED? (Y or N)

N <==== FORMATTER REFRESH? (Y or N)

	JOBNAME	ID	ASID	DUMPED?
CTL	IMS71RP1	IMS1	0116	YES
DL/I	DLIERES		0118	YES
DBRC	DBRCEORS		0119	YES
IRLM	IRLMC1	IRL1	0115	YES
TMS		-		

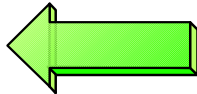
```
ABEND CODE = SYS 0C3      USER 0
MODULE      = UNKNOWN
```

```
IMS SDWA ADDRESS - 00584918  IMS RELEASE - 710
```

## Finding "Above the Bar" Log Buffers

▲ Select option 2 (HIGH-LEVEL) from the IMS Dump Formatting Primary Menu

```

----- IMS DUMP FORMATTING PRIMARY MENU -----
OPTION  ==> 2_ 
0  INIT          - IMS formatting initialization and content summary
1  BROWSE        - Browse Dump dataset (IPCS norm)          *****
2  HI-LEVEL      - IMS Component level formatting          *USERID   - M030776
3  LOW-LEVEL     - IMS ITASK level formatting              *DATE     - 01/07/18
4  ANALYSIS      - IMS dump analysis                      *JULIAN    - 01.199
5  USER          - IMS user formatting routines           *TIME     - 13:20
6  OTHER COMP    - Other IMS components (BPE, CQS...)      *PREFIX   - M030776
7  OTHER PROD    - Other IMS-related products             *TERMINAL - 3278
E  EDA           - IMS Enhanced Dump Analysis            *PF KEYS  -
T  TUTORIAL      - IMS dump formatting tutorial           *****
X  EXIT          - Exit IMS dump formatting

Enter END or RETURN command to terminate IMS component formatting.
Use PFKeys to scroll up and down if needed.

```

```

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* WITH IBM CORP. REFER TO COPYRIGHT INSTRUCTIONS FORM NUMBER G120-2083.  *

```

# Finding "Above the Bar" Log Buffers

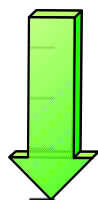
## ▲ Select LOG formatting from the IMS High-Level Dump Formatting Menu

```
----- IMS HIGH LEVEL DUMP FORMATTING OPTIONS   Row 1 to 14 of 30
Command ==>                                     Scroll ==> PAGE
```

```
N <====SPOOL OUTPUT? (Y or N)           N <====REFRESH FORMATTER? (Y or N)
      S = select      M = select,min      select choice(s) and hit enter
                                          to process or UP/DOWN to scroll
```

Additional IMS format requests==>

Cmd	Option	Description
—	AUTO	Internally determined options (by failing ITASK type)
—	ALL	All high level IMS dump formatting options
—	SUMMARY	PSW, regs, SAP, failing ITASK blocks at time of abend
—	SCD	SCD, SLX, FP ESCD, scheduler sequence queues
—	SAVEAREA	SAP, savearea, ECB prefix, UEHB (sorted by DSPNO)
—	DISPATCH	Dispatcher work areas, Dispatcher and Latch traces
—	SPST	System PSTs and subordinate blocks
—	RESTART	CHKPT ID table, SIDX, LCRE, RPST, RRE, EQEL, IEEQE, FRB
s	LOG	LCD, log buffer prefixes, log buffers (OLDS and MON)
=	DB	DDIRs, PDIRs, intent list, DLI/LOCK traces, DPSTs, DBT
=	DEDB	ALDS, DMCB, DMAC, XCRB, SRB, ESRB, FPT blocks



# Finding "Above the Bar" Log Buffers

▲ Enter Command: F 'OLDS BUFFER'

```

IPCS OUTPUT STREAM ----- Line 0 Cols 1 78
Command ==> f 'OLDS BUFFER' _          SCROLL ==> CSR
***** TOP OF DATA *****

```



**FYI...For those of you familiar with IMS formatting commands,  
we could have received this formatting through command:  
IP VERBX IMSDUMP 'IMS71RP1 FMTIMS LOG'**

```

* : * * * * *
* * * * * I M S   C T L   R E G I O N   F O R M A T T I N G
**IMS
* * * * *
* * * * *

```

DATE= 2001/199      TIME= 13.32.27

\*\*\*EYECATCHER AREA\*\*\*

```

**LCD            LOG CONTROL DIR.
**LCDM          DC-MONITOR LCD
**LGT            DLOG TRACE

```

# Finding "Above the Bar" Log Buffers

▲ Enter Command: F 'OLDS BUFFER' . Note Olds Buffer Address X'BABC00'

IPCS OUTPUT STREAM ----- FOUND: LINE 285 COL 4  
 Command ==> SCROLL ==> CSR

\*\*\*OLDS BUFFER PREFIX (LBUFFER) AT 00BABC00



```
*LBUFFER      - FCHAIN 00BABD00  FSCHN  00000000  FLAGS  80000000
                  LCD      00BBA000  BUFFA  2AD4B000  SAVEA  001DA5E0
                  BLKCNT  00000000  BLKOFF 00000000  DMYLOG 00000000
                  RESV    00000000  AWEQ   00000000  AWET   00000000
```

\*LBECBP1\*

```
00030  0FC4E2D7 00000000 00000000 00000000  *.DSP.....*
00040  00030909 2B01F150 001BE148 2AF58120  *.....1.....5a.*
00050  00000000 00000000 00000000 00000000  *.....*
LINES  00060-0007F  SAME AS THE ABOVE
```

\*LBECBP2-LBRESVW\*

```
00080  0FC4E2D7 00000000 00000000 00000000  *.DSP.....*
00090  00030909 2B01F150 001BE148 2AF58120  *.....1.....5a.*
000A0  00000000 00000000 00000000 00000000  *.....*
LINES  000B0-000EF  SAME AS THE ABOVE
```

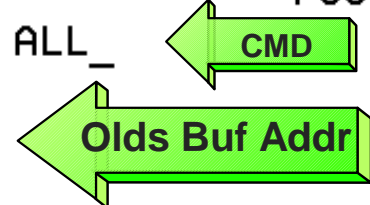


# Finding "Above the Bar" Log Buffers

▲ Enter Command: IP RSMDATA VIRTPAGE RA(00BABC00) ALL

IPCS OUTPUT STREAM ----- FOUND: LINE 285 COL 4  
 Command ==> IP RSMDATA VIRTPAGE RA(00BABC00) ALL\_ CMD SCROLL ==> CSR

\*\*\*OLDS BUFFER PREFIX (LBUFFER) AT 00BABC00



```
*LBUFFER      - FCHAIN 00BABD00  FSCHN  00000000  FLAGS  80000000
                  LCD      00BBA000  BUFFA  2AD4B000  SAVEA  001DA5E0
                  BLKCNT  00000000  BLKOFF 00000000  DMYLOG 00000000
                  RESV    00000000  AWEQ   00000000  AWET   00000000
```

\*LBECBP1\*

```
00030  0FC4E2D7 00000000 00000000 00000000  *.DSP.....*
00040  00030909 2B01F150 001BE148 2AF58120  *.....1.....5a.*
00050  00000000 00000000 00000000 00000000  *.....*
LINES  00060-0007F  SAME AS THE ABOVE
```

\*LBECBP2-LBRESVW\*

```
00080  0FC4E2D7 00000000 00000000 00000000  *.DSP.....*
00090  00030909 2B01F150 001BE148 2AF58120  *.....1.....5a.*
000A0  00000000 00000000 00000000 00000000  *.....*
LINES  000B0-000EF  SAME AS THE ABOVE
```

# Finding "Above the Bar" Log Buffers

▲ RSM Virtual Page Report shows "Above the Bar:" real address in "R LOC" field

IPCS OUTPUT STREAM ----- Line 12 Cols 1 78  
 Command ==> \_ SCROLL ==> CSR

## R S M V I R T U A L P A G E R E P O R T

JOBNAME	DSP	NAME	PAGE	G	K	F	R	P	D	B	L	STAT	T	R	LOC	LOC	LOC2
PAGECOMM	-		00BAB000	Y	7	Y	E	N	N	N	N	REAL	V		0014288C		

Totals (in decimal) for job COMMON:

REAL	AUX	VIO
1	0	0
DSN	FREF	HIDE
0	0	0
SWAX		
0		
SOAI	SIAI	
0	0	



The "R LOC" field presents the real page address. Three zeros must be added to the end of the field.  
 Real Page Location =  
 x'1\_4288C000'  
 Central storage to 128 GB =  
 x'20\_00000000'

# IMS Debugging in a 64-Bit World - Summary

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## ▲ Summary

- **64-Bit Terminology**
- **Recognizing z/Architecture in Dumps**
- **MVS Formatting Changes**
- **IMS Formatting Changes**
- **IMS z/Architecture Related APARs**
- **Verify Buffers Backed Above the Bar**