

Enterprise COBOL V5+ IPCS (Interactive Problem Control System) Dump Format Enhancements

Requirement:

Enterprise COBOL for z/OS
COBOL 5/6 Runtime(LE) March 2018 PTFs
UI54469 LE 2.1
UI54468 LE 2.2
UI54470 LE 2.3

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Improve COBOL V5+ IPCS dump formatting: Overview

Description

Using IPCS under COBOL 4.2 and earlier, it was relatively easy to locate a program's Working Storage. Under COBOL 5, this is a multi-step manual process. This request is to improve COBOL 5's IPCS dump formatting routine to make this easier for customers.

...

When COBOL programs have no "eye catchers" coded in their Working Storage sections, programmers have a hard time locating Working Storage in dumps without proper assistance from IPCS verb exits.

What is IPCS?

IPCS (Interactive Problem Control System from IBM)

- Can run under IPSF, BATCH or TSO
- Read Unformatted dumps (SVC, SYSMDUMP, stand-alone dumps) or Traces
- EXIT shipped with LE (Language Environment) to format COBOL control areas (For example, VERBEXIT LEDATA 'ALL')
 - SYS1.MIGLIB (Default installation dataset)

JOB Abends

```

00000000 SYMPTOM DUMP OUTPUT
IEA9951 SYMPTOM DUMP OUTPUT 097
USER COMPLETION CODE=4039 REASON CODE=00000000
TIME=14.54.58 SEQ=03540 CPU=0000 ASID=0675
PSW AT TIME OF ERROR 078D1000 A660BB82 ILC 2 INTC 00
ACTIVE LOAD MODULO ADDRESS=26612780 OFFSET=000C9402
NAME=CEEPLPKA
DATA AT PSW 266DBB7C - 00181610 0A0D508C 000498EC
GR 0: 00010000 84000000 1: 00000000 84000FC7
2: 00000000 00023878 3: 00000000 00000000
4: 00000000 266CF338 5: 00000000 2660BB82
6: 00000000 0001F358 7: 00000000 2660C4C0
8: 00000000 00023878 9: 00000000 00023354
A: 00000000 000241A7 B: 00000000 A66DBAAS
C: 00000000 00020C30 D: 00000000 00025AC8
E: 00000000 A66CEBE6 F: 7F651000 00000000
END OF SYMPTOM DUMP
IEA9931 SYSDUMP TAKEN TO ROYBAE.SYSDUMP.STD

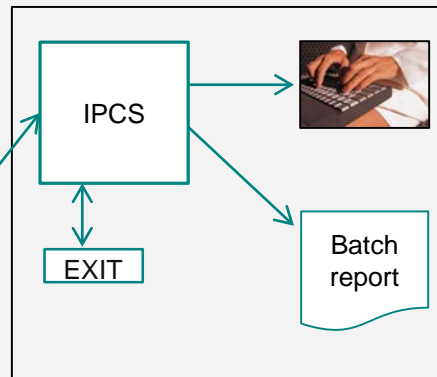
```

Captured dump dataset

```

BIOBASE ROYBAE_SYNDROMU.STD
Command -> [?]
***** Top of Data *****
DRZ H .....X.....CEPRINAL'W/J...JA...XORNAME ROYBAE
DRZ SC.....TEASNA.....mu..e.e.....e..d..o..g..i
DRZ CV.....X.....lma.....e..e..e..e..
DRZ CV.....0.....f.....Wad T Soc. Supp.....ELIS IMRO...J
DRZ CV.....0.....f.....RGA JI VAD 7...A...SUS...JA...MMA...J
DRZ CV.....0.....f.....LITCUSD MATERIALS - PROPERTY OF TIMO
DRZ CV.....0.....f.....QVBC 2H-yk U...IMM...U
DRZ CV.....f.....

```



TIP: Run IPCS on Batch

```
//USER1 JOB ,  
// MSGCLASS=S,TIME=(,09),REGION=0M,  
// NOTIFY=&SYSUID  
// EXEC PGM=IKJEFT01  
//SYSPROC DD DSN=SYS1.SBLSCLI0,DISP=SHR  
//SYSTSPRT DD SYSOUT=*  
//IPCSPRNT DD SYSOUT=*  
//IPCSTOC DD SYSOUT=*  
//SYSUDUMP DD SYSOUT=*  
//SYSTSIN DD *
```

```
IPCS  
SETDEF DSN('USER.SYSMDUMP.STD') NOCONFIRM  
DROPDUMP
```

```
/*#####*/  
/*# IPCSSEC: VERBX LEDATA 'ALL' */  
/*#####*/  
VERBX LEDATA 'ALL'  
/*
```

DUMP dataset to read

Comments (/* ... */)

Any IPCS commands

How to locate COBOL V4 Working Storage?

```
*** TGT MEMORY MAP ***
TGTLOC

000000 RESERVED - 72 BYTES
000048 TGT IDENTIFIER
00004C RESERVED - 4 BYTES
000050 TGT LEVEL INDICATOR
000051 RESERVED - 3 BYTES
000054 32 BIT SWITCH
000058 POINTER TO RUNCOM
00005C POINTER TO COBVEC
000060 POINTER TO PROGRAM DYNAMIC BLOCK TABLE
000064 NUMBER OF FCB'S
000068 WORKING-STORAGE LENGTH

...

000080 POINTER FROM USED BY THIS PROGRAM
00008A RESERVED - 2 SINGLE BYTE FIELDS
00008C NUMBER OF SECONDARY FCB CELLS
000090 LENGTH OF THE ALTER VN(VNI) VECTOR
000094 COUNT OF NESTED PROGRAMS IN COMPILE UNIT
000098 DDNAME FOR DISPLAY OUTPUT
0000A0 RESERVED - 8 BYTES
0000A8 POINTER TO COM-REG SPECIAL REGISTER
0000AC RESERVED - 52 BYTES
0000E0 ALTERNATE COLLATING SEQUENCE TABLE PTR.
0000E4 ADDRESS OF SORT G.N. ADDRESS BLOCK
0000E8 ADDRESS OF PGT
0000EC RESERVED - 4 BYTES
0000F0 POINTER TO 1ST IPCB
0000F4 ADDRESS OF THE CLLE FOR THIS PROGRAM
0000F8 POINTER TO ABEND INFORMATION TABLE
0000FC POINTER TO TEST INFO FIELDS IN THE TGT
000100 ADDRESS OF START OF COBOL PROGRAM
000104 POINTER TO ALTER VNI'S IN CGT
000108 POINTER TO ALTER VN'S IN TGT
00010C POINTER TO FIRST PBL IN THE PGT
000110 POINTER TO FIRST FCB CELL
000114 WORKING-STORAGE ADDRESS
000118 POINTER TO FIRST SECONDARY FCB CELL
```

```
IGT: 268AA100
+000048 IDENT:3TGT LVL:06 FLAGS:60020260 RUNCOM-00047050
+00005C COBVEC:00013C4C #FCBS:00000000 WS_LEN:00000003
+000070 SMG_WRK:00000000 CAA:00024C36 LEN:00000148
+00008C EXT_FCBS:00000000 OUTDD:SYSOUT ABINF:26600F2C
+0000FC TESTTIME:00000000 PGMADDR:26600DD0 1STFCB:00000000
+000114 WS_ADDR:268AE0C0 1STEXTFCB:00000000
```

IPCS VERBX LEDATA 'ALL' output

COBOL V4 listing
Compiled with 'LIST' option

How to locate COBOL V5+ Working Storage?

For example, COBOL 6 compiled with Rent

Q. Where are the storage locations of COBOL Identifiers?(UsrVar1/UsrVar2)?

X1.CBL

```
IDENTIFICATION DIVISION.
```

```
PROGRAM-ID. X1.
```

```
ENVIRONMENT DIVISION.
```

```
DATA DIVISION.
```

```
WORKING-STORAGE SECTION.
```

```
01 UsrVar1 pic 999 value 111.
```

```
01 UsrVar2 pic 999 value 222.
```

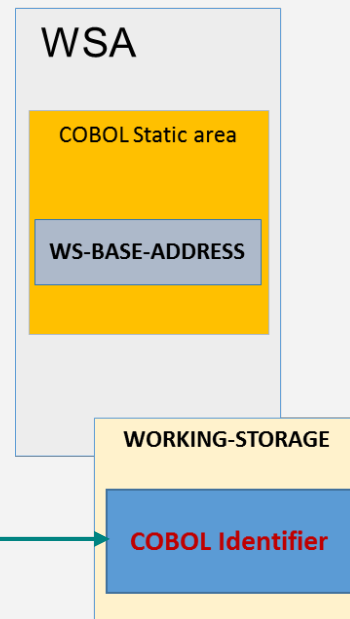
```
PROCEDURE DIVISION.
```

```
BEGIN.
```

```
    compute UsrVar2 = UsrVar1 / 0
```

```
    stop run.
```

```
END PROGRAM X1.
```



How to locate COBOL V5+ Working Storage?

It is documented in **COBOL 6.1 Migration Guide**:

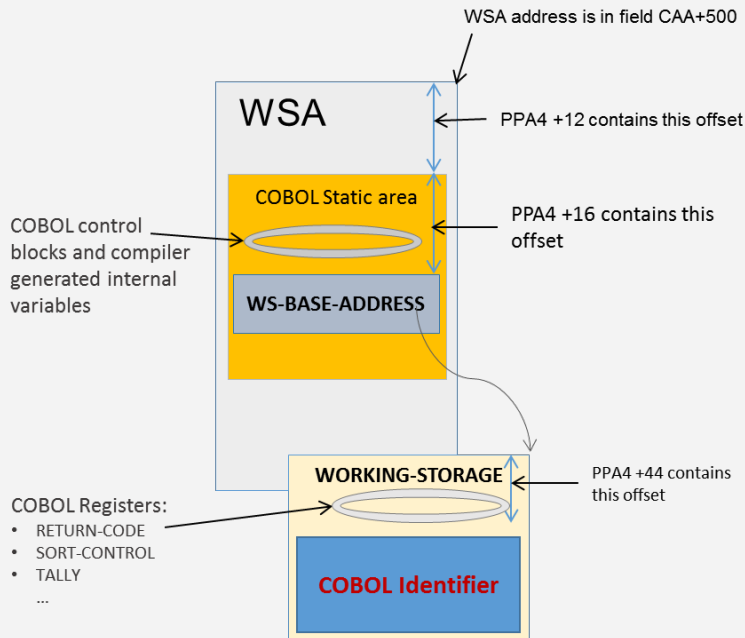
...
WORKING-STORAGE SECTION changes

You can use the following method to locate the WORKING-STORAGE SECTION.

- ...
1. From the entry point of the COBOL program, find PPA1, PPA2, and PPA4.
- ...
2. The fields in PPA4 provide information about the starting point address of the WORKING-STORAGE SECTION.

See the "COBOL V5 32-bit PPA4 layout" table in the z/OS Language Environment Vendor Interfaces. This layout applies to COBOL V5 and later programs. The major fields that we need are as follows:
Offset Length Description

...



Where is PPA4 in COBOL V5+?

It is documented in **Language Environment Vendor Interface**:

...

Prolog information blocks

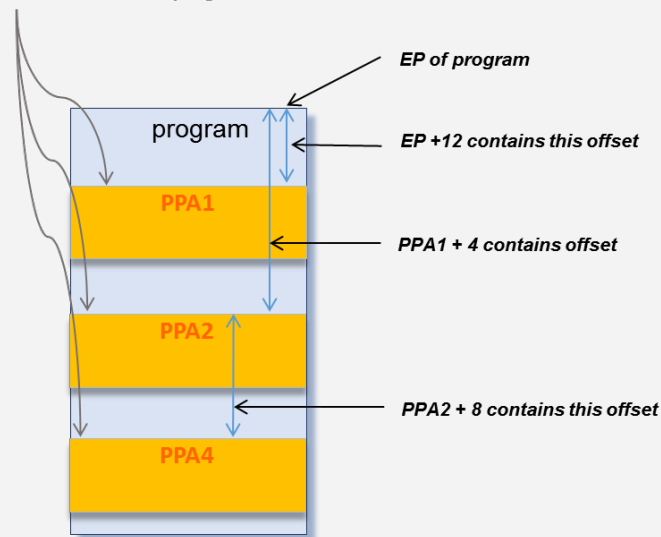
Program Prolog Area-1 (PPA1) appears for every Language Environment entry point.

There is a one-to-one correlation between a PPA1 and a DSA. The length of the name offset field (PPA1 offset 00) ranges from 32 to 255 bytes. Note that for the FASTLINK version, the value in this field is the offset to the name length field, divided by 2; therefore, the value of the field may range from X'10' to X'FF.

...

PPAs

LE control blocks containing information about program



Enhancement: IPCS VERBEXIT LEDATA 'ALL'

IPCS: VERBEXIT LEDATA 'ALL'

```
----- Control blocks for program X1 -----
  CLE: 000430B8
+000000 CLEENTNM:X1      CLESH1:00 CLEV4FLG:00
+00000C CLELGLST:00000000 CLEFLG1:35 CLEFLG2:81 CLELDADR:A6600000

...
+-----
```

New Enhancement

```
PPA1: 266005D8 (Entry name:X1)
PPA2: 26600798
PPA3: 26600708
PPA4: 266007F0 (CUName :X1)
CEESTART: 26600DE8
CEEELLST: 26600FE0
IEWBLIT: 26601498

COBOL version: 060200. Compiled Date and Time: 2018-01-30 13:58:07.
STATIC MAP(RENT): 26A64058 112(X'70') bytes.
WORKING-STORAGE MAP: 26A64118 163(X'A3') bytes.
COBOL Working-Storage resides in the WORKING-STORAGE MAP (UsrWrkStrg: 26A641B0 11(X'B') bytes).
```

COBOL listing

***** STATIC MAP *****		
OFFSET (HEX)	LENGTH (HEX)	NAME
0	C	BLT_Ptrs
C	60	GPCB
6C	4	WS-BASE-ADDRESS
***** END OF STATIC MAP *****		
***** WORKING-STORAGE MAP *****		
OFFSET (HEX)	LENGTH (HEX)	NAME
0	4	INTENVPTR
8	2	RETURN-CODE
10	2	SORT-RETURN
18	8	SORT-CONTROL
20	4	SORT-CORE-SIZE
28	4	SORT-FILE-SIZE
30	4	SORT-MODE-SIZE
38	8	SORT-MESSAGE
40	4	TALLY
48	1	SHIFT-OUT
50	1	SHIFT-IN
58	4	XPL-CODE
60	1E	XPL-EVENT
80	4	XPL-INFORMATION
88	4	JSON-CODE
90	4	JSON-STATUS
98	3	USRVAR1
A0	3	USRVAR2
***** END OF W-STOR. MAP *****		

WSA

COBOL Static area

WS-BASE-ADDRESS

WORKING-STORAGE

COBOL Identifier

Enhancement: IPCS VERBEXIT LEDATA 'ALL' Required PTFs?

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Fix list for Enterprise COBOL for z/OS
<https://www.ibm.com/support/docview.wss?uid=swg27041164>

COBOL Resources

Enterprise COBOL

Product Page:

<https://www.ibm.com/us-en/marketplace/ibm-cobol>

Documentation:

<http://www.ibm.com/support/docview.wss?uid=swg27036733>

Fix list for Enterprise COBOL for z/OS

<https://www.ibm.com/support/docview.wss?uid=swg27041164>

RFE community: Request For Enhancement

https://www.ibm.com/developerworks/rfe/?PROD_ID=698

COBOL Café discussion Forum

<https://www.ibm.com/developerworks/community/forums/html/forum?id=11111111-0000-0000-0000-000000002281>

Thank you



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