natural

Dump Utility

SOFTWARE AG

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Scope

This document has been created for internal customer training only and will not be maintained on regular basis.

Introduction

The Dump utility provides information for Software AG technical support personnel in order to enable them to locate an error that caused an abnormal termination (abend) of the Natural system.

The following Dump commands are specified in the Natural for Mainframes Documentation:

ZAPS   Displays a list of all Zaps applied.

SZAP   Displays a list of all special Zaps applied.

SRCE   Displays the inventory of source changes applied per product

SSRC   Displays the inventory of special source changes applied per product.

SVAR   Displays TP monitor and operating system dependent system variables and additional information.

?   The DUMP command provides several other options (as explained on the help screens you get when you enter a question mark (?) on the DUMP menu). If necessary for error diagnosis, Software AG technical support personnel will tell you when and how to use these options.

This document contains a short description of those Dump options which are not specified in the Natural for Mainframes Documentation.

1 Structure of the Dump Screen

The standard Dump screen has a uniform structure. The lines have the following meaning:

Line 1-3: **Abend information**

Line 5-20: **Memory area and additional information**

Line 21: **Message line**

Line 22: **Command line**

Line 23-24: **Key allocation**

```
Code  S0C7 ILC  0004  PSW 078D10 00 892B1FC2  Disp  00003166   Csect  NATARI2
R0-7  00000006 171C87CA 00000020 093985F8  1BEE4520 1BEE4496 171C87D6 0000011E
R8-F  FFFFFA30 1BE41C00 092AEE58 892B1E94  1BE1E8B0 1BE129B8 892B21B6 00000010

092A1000  47000000 D5C1E3E2 E3E4C240 F4F2F140  ....NATSTUB 421   Cur. Nucleus
092A1010  F0F660F0 F260F2F0 40F1F24B F4F14040  06-02-20 12.41    NAT421RE
092A1020  092E4220 092C9948 092C8228 0944A670  ......r...b...w.  Load Point
092A1030  093A2638 092E694C 092E00D8 00000000  .......<...Q....  092A1000
092A1040  00000000 00000000 093001B8 09A00F10  ...............   Entry Point
092A1050  093C4E00 09516228 093A1640 09316420  ..+........ ....  092A1000
092A1060  09317BC0 093BD218 093A22E8 09419CA0  ..#...K....Y....  Length
092A1070  09314BA8 092F9FC2 093FBCAA 093FBAA0  ...y...B........  0075FF30
092A1080  58F0C5A8 58F0F0E4 58F0F004 07FF58F0  .0Ey.00U.00....0  Relocation
092A1090  C5A858F0 F0E458F0 F00C12FF 072F06F0  Ey.00U.00......0  ABSOLUTE
092A10A0  07FE58F0 C5A858F0 F0E458F0 F01012FF  ...0Ey.00U.00...  Cur. Location
092A10B0  072F06F0 07FE58F0 C5A858F0 F0E458F0  ...0...0Ey.00U.0  NATSTUB
092A10C0  F02C07FF 58F0C5A8 58F0F0E4 58F0F030  0....0Ey.00U.00.  Slot Name
092A10D0  07FF58F0 C5A858F0 F0E458F0 F03407FF  ...0Ey.00U.00...  N1
092A10E0  58F0C5A8 58F0F0E4 58F0F03C 07FF58F0  .0Ey.00U.00....0  N2
092A10F0  C5A858F0 F0E458F0 F04812FF 072F06F0  Ey.00U.00......0  N3

Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
Cont  Help  Flip  Exit  Calc  =     --    -     +     Csct  -H    +H    Canc
```

The elements of the Dump screen are described below.

1.1 Abend Information

On the standard Dump screen, the lines 1-3 show the following abend information if an abend has occurred:

```
Code  S0C7 ILC  0004  PSW 078D10 00 9B0B8FC2  Disp  00003166   Csect  NATARI2
R0-7  00000006 1345B76E 00000020 1B19F5F8  1D98A160 1D98A14E 1345B77A 00000186
R8-F  FFFFFA30 1D8A2188 1B0B5E58 9B0B8E94  1D88AE38 1D87EF40 9B0B91B6 00000010
```

Code   Program Interruption Code, e.g.
            S0C1 = Operation exception
            S0C4 = Protection exception
            S0C7 = Data exception

PSW   The program-status word (PSW) includes the instruction address, condition code, and other information used to control instruction sequencing and to determine the state of the CPU. The current PSW usually points to the address of the next instruction to be executed (Byte 5-8). In some specific cases, the PSW will point to the address of the failing instruction.

ILC   Instruction Length Code

Disp   Displacement between the start of the module displayed in field Csect and the instruction address in the PSW.

Csect   Name of the control section where the abend occurred.

R0-7   Abend registers 0 - 7

R8-F   Abend registers 8 - F

Please note that the DUMP utility always shows the current information of the Natural system. Information of a past event, e.g. an abnormal end have to be stored in the Natural control blocks (or buffers) to be able to use them for problem determination. Especially the contents of the areas where the abend registers R0, R1, …, RF are pointing to are containing current data and not data of the moment when the abend occurred.

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With the command **ABEND** it is possible to show more information about the abend, e.g. the 4 floating-point registers (FR0, FR2, FR4 and FR6) or the 16 access registers (AR0, AR1, …, ARF) which are used to access data spaces in an ESA system. Furthermore, you can see the name of the Natural program, the name of the Natural library and the source line number that was processed when the abnormal end occurred.

```
12:34:56                ***** NATURAL DUMP COMMAND *****              2006-09-30
User HGS                       - Abend Information -              Page  1 of  1

Code  S0C7 ILC  0004  PSW 078D10 00 892B1FC2  Disp  00003166   Csect  NATARI2
R0-7  00000006 171C87CA 00000020 093985F8  1BEE4520 1BEE4496 171C87D6 0000011E
R8-F  FFFFFA30 1BE41C00 092AEE58 892B1E94  1BE1E8B0 1BE129B8 892B21B6 00000010

FR0-6  4E00000000009842  491AD27480000000   423F800000000000  4E00000000009842

AR0-7  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000
AR8-F  00000000 00000000 00000000 00000000  00000000 00000000 00000000 00000000

System Abend Code (hex)    0C7      Abend Reason Code (hex)    00000000

Op.Sys.  MVS/ESA  TP-Mon.  COMPLETE Device   PC       User    HGS
Program  A7       Library  HGS      Statment 0060     Level   1
Pf-Key   ENTR     InputLen 8        Dialogs  25       Errors  0
Command  A7       *DATA    0        Last Err 0000
DB-Call           DB/FNR   0/0


Command ===>
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
Cont  Help  Flip  Exit  Calc                                            Canc
```

In addition, the commands **PSW** and **CRn** (n=0,1,2,…,F) are available. These commands allow you to go directly to the address which is stored in the PSW or the abend registers.

1.2 Memory Area and Additional Information (Line 5-20)

```
     1          2          3          4          5          6                     7

1B0B8FBE   448FB432   4710AB2A   4740B1D0   91101002   ?...?...?  ..j...      Cur. Nucleus
1B0B8FCE   4780B1B4   415000FF   14588850   00041E54   ?}...&...?h&...?        QA420RE
1B0B8FDE   17334330   50005A30   BCEC4A30   CB924330   ..?.&.Ü..\..?k?.        Load Point
1B0B8FEE   30004230   500047F0   B1B49108   100247E0   ..].&.?0..j...?.        1B0A8000
1B0B8FFE   B1B44150   00FF1458   88500004   47F0B1B4   ...&...?h&..?0..        Entry Point
1B0B900E   47000000   47000000   47000000   47000000   ?...?...?...?...        1B0A8000
1B0B901E   5950BCF4   4770B1AA   F9334000   BCF84740   ?&.4??..9.  ..8?        Length
1B0B902E   AAF2F933   4000BCFC   4720AAF2   47F0B1B4   .29.  ..??..2?0..       00764000
1B0B903E   F9664000   BD464720   AAF29120   10024710   9?  ..??..2j...?.       Relocation
1B0B904E   B23A9114   100247E0   B54291F0   40004780   ..j...?.@]j0 .?}        ABSOLUTE
1B0B905E   B54247F0   BD4E9110   10024780   B1B49108   @]?0.+j...?}..j.        Cur. Location
1B0B906E   100247E0   B1B447F0   AAF24480   B26A1733   ..?...?0.2?}.ö..        NATARI2+3166
1B0B907E   4330C937   5A30BCEC   4A30CB92   43303000   ?.I.Ü..\..?k?...        Slot Name
1B0B908E   4230C937   4830100A   48501004   58F0BCE8   ].I.@...@&..?0.Y        N1
1B0B909E   0DEF12FF   4770AB6A   91401002   4710B226   .?..??.öj ..?...        N2
1B0B90AE   4480B288   47E0B11E   47F0AACA   4430B276   ?}.h?...?0..?..?        N3
```

Column 1   **Address**

By default, absolute addresses are displayed. These can be switched to relative addresses using the command R=*, R=<address> or R=<name> (see section **Relative Addresses**).

Column 2-5   **Memory content in hexadecimal format.**

Column 6   **Memory content in character format.**

The command **DISA** translates the machine code instructions back into assembly language mnemonics.
The command **DUMP** switches back to the dump format.

Column 7   **Additional Information:**

Cur. Nucleus: Name of the current Natural nucleus.

Load Point: Address where the specified module is loaded.

Entry Point: Entry point of the specified module.
With the command **ENTRY** you can go directly to the entry point of the module.

Length: Length of the specified module.

Relocation: Contains the reference address if relative addresses are displayed. Otherwise, the string ABSOLUTE is used to indicate the usage of absolute addresses.

Cur. Location: Name and offset of the current address.

Slot Name: See section **Working with Slots**.

2.   DUMP Commands

This section describes the most important commands of the Dump utility. The commands are grouped by the following functions:

➢ Positioning
➢ Scanning
➢ Relative Addresses
➢ Working with Slots

2.1   Positioning

+	Position forwards one page. This is equal to the command **+100** (24*80 screen).
-	Position backwards one page. This is equal to the command **-100** (24*80 screen).
+H	Position forwards half a page. This is equal to the command **+80** (24*80 screen).
-H	Position backwards half a page. This is equal to the command **-80** (24*80 screen).
--	Position to the top of the memory area.
TOP	Same function as command --.
nnnn	Go to address *nnnn* (hex).
+*nnnn*	Position forwards *nnnn* bytes (hex).
-*nnnn*	Position backwards *nnnn* bytes (hex)
.*nnnn*	Goto to offset *nnnn*.
*****	Go to the address which is displayed at the top of the memory area. This command is cursor-sensitive. Thus it is possible to go directly to any address which is displayed in the memory area. If the address is located in the Natural thread, its address will be relocated.
^	Same function as command ***** but without relocation of the address (see also note below).
#	Goto the current address plus the address which is displayed at the top of the memory area (relative addressing).

Note:

In a Natural thread storage environment (typical for multi-user environments, e.g. CICS), a large storage area called thread is pre-allocated for a session. During a session, each buffer allocation request (getmain) is satisfied within its thread by Natural itself. Upon certain events (terminal I/Os and long waits), the thread storage may be compressed and rolled out to external storage (e.g. roll buffer or swap pool). When a suspended session is to be resumed, it is rolled in from external storage into a thread again. This thread can be located at different virtual address than the thread used before. In this case Natural relocates all buffers which are contained in the thread. This process is called **thread relocation**. The DUMP utility takes this relocation into account. Exceptions are the command **^** and addresses which are entered directly in the command line.

2.2 Scanning

The Dump utility offers the following commands to scan for data in the memory areas of Natural.

SCAN [-]*scan-value* This command scans for a string in the dump area. The scan starts at the current address and ends at the area boundary, e.g. the end of a buffer, thread, pool or module. The scan-value can be specified in hexadecimal format (default) or character format. To use the character format, the scan-value has to start with a single quotation mark. The SCAN command converts lowercase to uppercase in the scan-value.
The scan direction can be changed from forward to backward by using the direction indicator '-' in front of the scan-value.

Examples:
```
SCAN D5C1E3E4D9C1D3
SCAN 'NATURAL'
SCAN 'NATURAL
SCAN –D5C1E3E4D9C1D3
SCAN –'NATURAL
```

SCANX This command provides the same function as the SCAN command but in contrast it is not limited to any area boundary. Note that it is not possible to scan in fetch protected areas.

RSCAN This command scans for the next occurrence of the scan value.

= This command has the same function as the command RSCAN.

2.3   Relative Addresses

By default the dump utility displays addresses as absolute addesses. However, it is possible to switch to relative addresses.

R=*   After execution of the command R=*, the current address is displayed as address '00000000'.
For all other addresses the displacement between this current address and the absolute address is displayed.

R=M   The relocation of the addresses is switched off. The absolute addresses are displayed.

R=*address*   The specified address is used for the relocation of the addresses.

R=*name*   The address of the specified object is used for the relocation of the addresses.

```
Code  S0C7 ILC  0004  PSW 078D10 00 892B1FC2  Disp  00003166   Csect  NATARI2
R0-7  00000006 171C87CA 00000020 093985F8  1BEE4520 1BEE4496 171C87D6 0000011E
R8-F  FFFFFA30 1BE41C00 092AEE58 892B1E94  1BE1E8B0 1BE129B8 892B21B6 00000010

00000000   10800128 00118000 40022101 4C000040   ........ ...<..   Cur. Nucleus
00000010   1AEB2D30 1AEA96C0 1AE16F88 1AE170F8   ......o...?h...8  NAT421RE
00000020   1AEA7658 1AEABC50 000006A9 00002000   .......&...z....  Load Point
00000030   00001F00 1ADD6580 00000931 1ADD6680   ................  092A1000
00000040   00000011 00001C80 00000003 06A90000   .............z..  Entry Point
00000050   00000043 01BA0050 00500050 00500000   .......&.&.&.&..  092A1000
00000060   00480018 00180000 00000018 00000000   ................  Length
00000070   1AC00000 00000000 00000000 0080067E   ...............=  0075FF30
00000080   1AE17078 40404040 40404040 40400000   ....         ..  Relocation
00000090   07804040 40404040 4040D4C1 C9D5D4C5   ..        MAINME  IOCB
000000A0   D4F17DE8 6C006F00 05000000 00000000   M1'Y%.?.........  Cur. Location
000000B0   8939C74A FE9C6AC2 C4C1C5C5 E3C3D1F5   i.G....BDAEETCJ5  IOCB
000000C0   C8C7E240 40404040 D5C1E3F4 F2404040   HGS     NAT42     Slot Name
000000D0   D7C34040 40404040 A1090000 2C08030B   PC      ........  N1
000000E0   00000000 1A64A74C 00000000 00000000   ......x<........  N2
000000F0   00000000 00000000 00000000 00000F00   ................  N3
Command ===> r=iocb
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
      Cont  Help  Flip  Exit  Calc  =     --    -     +     Csct  -H    +H    Canc
```

2.4   Working with Slots

The slots of the Dump utiliy work like shortcuts. After you have located a certain memory area, you can store its start address with the command **N*n***. You can also specify the address directly or with symbolic names (name of a module, csect, buffer, etc.). The slots are listed in the bottom right part of the screen. On a 24*80 screen (model 2) you can see the first three slots, whereas on a 43*80 screen (Model 4) all 9 slots are displayed.

N*n*[=*name*][address]   Save the address in slot ***n*** (n=1,2,3,…,9) under the specified ***name***.
If no address is specified, the address of the current displayed memory area will be taken.

P*n*   Position to the address stored in slot ***n*** (n=1,2,3,…,9).

D*n*   Delete slot ***n*** (n=1,2,3,…,9).

```
Code  S0C7 ILC  0004  PSW 078D10 00 892B1FC2  Disp  00003166   Csect  NATARI2
R0-7  00000006 171117CA 00000020 093985F8  1BCDE520 1BCDE496 171117D6 0000011E
R8-F  FFFFFA30 1BC3BC00 092AEE58 892B1E94  1BC188B0 1BC0C9B8 892B21B6 00000010

1BCD83EC  E3E2E3D7 D9C7F0F7 40F0F0F6 F040D5C1  TSTPRG07 0060 NA  Cur. Nucleus
1BCD83FC  E3F0F9F5 F440C182 95969994 819340A3  T0954 Abnormal t  NAT421RE
1BCD840C  85999489 9581A389 9695407A F17A4084  ermination :1: d  Load Point
1BCD841C  A4998995 87409799 96879981 944085A7  uring program ex  092A1000
1BCD842C  8583A4A3 8996954B 04E2F0C3 F7404040  ecution..S0C7     Entry Point
1BCD843C  40404040 40404040 40404040 40404040                    092A1000
1BCD844C  40404040 40404040 40404040 40404040                    Length
1BCD845C  40404040 40404040 40404040 40404040                    0075FF30
1BCD846C  40404040 40404040 40404040 40404040                    Relocation
1BCD847C  40404040 40404040 40404040 40404040                    ABSOLUTE
1BCD848C  40404040 40404040 40404040 40404040                    Cur. Location
1BCD849C  40404040 40404040 40404040 40404040                    ERRMSG+C4
1BCD84AC  40404040 40404040 40404040 40404040                    Slot Name
1BCD84BC  40404040 40404040 40404040 40404040                    N1 LASTMSG
1BCD84CC  40404040 40404040 40404040 40404040                    N2
1BCD84DC  40404040 40404040 40404040 40404040                    N3

Command ===> n1=lastmsg errmsg+c4
Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
Cont  Help  Flip  Exit  Calc  =     --    -     +     Csct  -H    +H    Canc
```

3 Natural Components

3.1 Natural Nucleus

In nearly all Natural environments the begin of the Natural nucleus (load point) will be displayed when the Dump utility is invoked. Thus the command **START** can be used to locate the Natural nucleus as well as the command **NUC**.

The command **CSECTS** (or PF9 key) lists all csects of the Natural nucleus, starting with the module NATSTUB and ending with the module NATLAST. For every module/csect, its name, address, offset (relative to the start of the nucleus) and the length is displayed. The first column of this list with the header 'M' can be used to go to any module/csect contained in this list. This can be also achieved by entering the name of the module/csect directly in the command line.

```
+----------------CSECTs----------------+
! M   Name   Address   Offset   Length  !
!                                       !
! _  _____  _____  _____  _____  !
!                                       !
! _  NATSTUB  092A1000 00000000 00000120  !
! _  NATADA   092A1120 00000120 00000190  !
! _  NATADA23 092A12B0 000002B0 00000260  !
! _  NATADAIO 092A1510 00000510 00000770  !
! _  NATADRI2 092A1C80 00000C80 00001730  !
! _  NATADX2  092A33B0 000023B0 00002568  !
! _  NATADX23 092A5918 00004918 00003400  !
! _  NATADX42 092A8D18 00007D18 00004D00  !
! _  NATAOEC  092ADA18 0000CA18 000003C8  !
! _  NATARCT  092ADDE0 0000CDE0 00001078  !
!                                       !
+--------------------------------------+
```

3.2 Natural Driver

The start of the Natural driver can be located with the command **DRV**. The entry point table (command **EPT**) of the Natural driver consists of addresses which point to entries in the Natural nucleus. An entry can be displayed directly by entering its name into the command line, e.g. **CMWTERM** (write to terminal), **CMWHC** (put line to hardcopy), **CMTASK** (start new task), **CMOCAL** (call external module), **CMLOAD** (load external module) and so on.

3.3   Natural Buffers

Natural buffers are displayed by entering the name of the buffer into the command line. A list of all existing buffers is available in the Natural macro NAMDS. Every Natural buffer (with the exception of the IOCB) starts with a prefix which contains control information for the Natural buffer management. This prefix has a length of 32 bytes (20 hex). The most important Natural buffers are briefly described in the following.

IOCB (Input/Output Control Buffer)
The IOCB is the central buffer for the Natural driver. It contains all address pointers to input/output specific buffers (i.e., page buffer, screen buffer, …). Furthermore there are pointers to important Natural components (i.e., Natural nucleus) and TP-specific control blocks (i.e., CSA under CICS).
DUMP command: **IOCB** or **IOB**

BB (Natural User Buffer)
The BB buffer is the most important buffer in the Natural system. It contains all important runtime information. The start of the BB is a 512-byte area called 'CRAB'. As the BB is always addressed by Register 12, and the C-runtime needs Register 12 pointing to a 512-byte work space, this buffer has been allocated in front of the BB. The BB and the user buffer extension area (ESIZE) are stored together in one buffer which is named BB#ESIZE. If you use the command **BB#ESIZE** the buffer is displayed with the buffer prefix whereas the command **BB** shows it without the buffer prefix.

PCB (Parameter Control Block)
In addition to information about parameter settings and values, the parameter control block contains the Natural translation tables.
Command: **PCB** or **ISIZE**

EPLTAB (External Program Table)
In the EPLTAB buffer, the external program table (**EPL**) is stored. As of Natural version 4.2, it is possible to display the table formatted and sorted by name (command **EPLN**), by program (command **EPLP**) or by table sequence (command **EPLS**).

```
+---------------Entry Points List By Entry Sequence---------------+
! M    Name    Program   Address TabEntry  Flags       Type + Mode  !
! _ _____ _____ _____ _____ _____ _____ !
!                                                                   !
! _ CMUB      NAT421RE 093FC420 00000020 00200000                   !
! _ CMSLFT    NAT421RE 094372C0 00000038 00200000                   !
! _ CMMPP     NAT421RE 09374510 00000050 00200000                   !
! _ CMUDEB    NAT421RE 09401B20 00000068 00200000                   !
! _ CMLIST    NAT421RE 093477C0 00000080 00200000                   !
! _ CMLIST2   NAT421RE 09348360 00000098 00200000                   !
! _ CMRNS     NAT421RE 0938E060 000000B0 00200000                   !
! _ CMCNAM    NAT421RE 092C7FF8 000000C8 00200000                   !
! _ CMRSP     NAT421RE 09348FC8 000000E0 00200000                   !
! _ CMKCOM    NAT421RE 09350E58 000000F8 00200000                   !
!                                                                   !
+-----------------------------------------------------------------+
```

Epilog

There are several other commands available which were not mentioned before, e.g.

BP	Show buffer pool
SWAP	Show swap pool
DSPC	Show Data Space
§	Take as ALET
PARM	Show active Natural parameter module
etc.	

Also there are environment specific commands, e.g. for CICS or VSAM, and not to forget: there is also a calculator available (PF4 key).

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If you have any comments, suggestions or corrections, please mail them to:
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