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VAX/VMS Internals

VMS V4.4
Supplementary Update Material

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INTRODUCTION

Since VAX/VMS V4.0 was released, changes have been made to the System Dump Analyzer (SDA) and the VAX/VMS documentation has been enhanced. This update module gives an overview of the new System Dump Analyzer (SDA) commands and summarizes the changes to the VAX/VMS documentation.

OBJECTIVES

To perform your job effectively on a VAX/VMS V4.4 system, you should be able to:

- Recognize the changes in the VAX/VMS documentation set
- List and use the new System Dump Analyzer (SDA) commands

CHANGES IN VAX/VMS DOCUMENTATION

Table 1 Documentation Changes for VAX/VMS V4.4

V4.0 or V4.2 Manual	Change	New Manual(s)
VAX/VMS DCL Dictionary	Split into 2 manuals	VAX/VMS DCL Concepts Manual (contains Part I, Using the Using the Command Language) VAX/VMS DCL Dictionary (contains Part II, Command Descriptions)
User's Guide to EVE	Combined with another manual	Guide to Text Processing on VAX/VMS
VAXTPU EDT Keypad Emulator Quick Reference Guide	Combined with another manual	Guide to Text Processing on VAX/VMS
Guide to VAX/VMS System Management and Daily Operations	Name change	VAX/VMS System Manager's Reference Manual
VAX/VMS Symbolic Debugger Reference Manual	Name change	VAX/VMS Debugger Reference Manual
Guide to Networking on VAX/VMS	Name change	VAX/VMS Networking Manual

OVERVIEW OF THE NEW SYSTEM DUMP ANALYZER (SDA) COMMANDS

Since VAX/VMS V4.0 was released, the following new SDA commands have been added:

- ATTACH
- SPAWN

  Also, new qualifiers are available for the EVALUATE, EXAMINE, and SEARCH commands as follows:

  - EVALUATE /PSL
  - EVALUATE /PTE
  - EVALUATE /SYMBOLS
  - EXAMINE /NOSUPPRESS
  - EXAMINE /PTE
  - SEARCH /LENGTH=length_specifier
  - SEARCH /STEPS=step_factor

EXAMPLES AND ADDITIONAL INFORMATION

The ATTACH and SPAWN Commands

The ATTACH command allows you to switch control of your terminal to another process in your job. The /PARENT qualifier allows you to switch control of your terminal to the parent process of the current process.

The SPAWN command creates a subprocess from the current process. The context is copied from the current process to the spawned process.

```
$ ANALYZE/SYSTEM

VAX/VMS System analyzer

SDA> SPAWN

$ ATTACH MARSH
SDA> ATTACH MARSH_1
%DCL-S-RETURNED, control returned to process MARSH_1
$ log
  Process MARSH_1 logged out at 19-JAN-1986 14:53:54.61


SDA>
```

Example 1 Using the ATTACH and SPAWN Commands

The EVALUATE/PSL Command

The EVALUATE/PSL command evaluates the specified longword, displaying its contents in the format of a processor status longword.

In this example, three steps are shown:

Step 1 Find and format the current PCB

Step 2 From step 1, find and format the PHD

Step 3 From step 2, find and format the PSL

```
Step 1

SDA> EXAMINE SCH$GL_CURPCB
SCH$GL_CURPCB:  80110A60    "`..."
SDA> READ SYS$SYSTEM:SYSDEF.STB
SDA> FORMAT @SCH$GL_CURPCB

80110A60   PCB$L_SQFL              8000201C
80110A64   PCB$L_SQBL              8000201C
80110A68   PCB$W_SIZE                  0120
80110A6A   PCB$B_TYPE                    0C
 .   .      .     .                 .     .
 .   .      .     .                 .     .
 .   .      .     .                 .     .
80110AC0   PCB$L_PID               000E0003
80110AC4   PCB$L_EPID              000000E3
80110AC8   PCB$L_EOWNER            00000000
80110ACC   PCB$L_PHD               8019AA00 <---- PHD Address
80110AD0   PCB$T_LNAME             "MARSH"
 .   .      .     .                 .     .
 .   .      .     .                 .     .
 .   .      .     .                 .     .
80110B78   PCB$L_WAITIME           002173DE
80110B7C   PCB$L_PMB               00000000
           PCB$C_LENGTH
```

Example 2 Using the EVALUATE/PSL Command
(Sheet 1 of 2)

The EVALUATE/PSL Command

```
Step 2

SDA> FORMAT G19AA00
%SDA-E-NOSYMBOLS, no "PAGED" symbols found to format this block

Note: The PHD has no TYPE field. The /TYPE qualifier must be added
      to the SDA> FORMAT command

SDA> FORMAT/TYPE=PHD G19AA00

8019AA00   PHD$Q_PRIVMSK          00108001
8019AA04                          00000000
8019AA08   PHD$W_WSLIST               0063
8019AA0A   PHD$W_WSAUTH           0262
8019AA0C   PHD$W_WSLOCK               0071
8019AA0E   PHD$W_WSDYN            007D
8019AA10   PHD$W_WSNEXT               00DA
8019AA12   PHD$W_WSLAST           0382
 .   .      .     .                .     .
 .   .      .     .                .     .
 .   .      .     .                .     .
8019AAB4   PHD$L_R11              0C0C0007
8019AAB8   PHD$L_R12              7FFE9DC4
8019AABC   PHD$L_R13              7FFE7DE4
8019AAC0   PHD$L_PC               8011400A
8019AAC4   PHD$L_PSL              00420008 <------ Process PSL
8019AAC8   PHD$L_P0BR             8019C400
8019AACC   PHD$L_P0LRASTL         0400079E
           PHD$B_ASTLVL
8019AAD0   PHD$L_P1BR             7F9A4400
 .   .      .     .                .     .
 .   .      .     .                .     .
 .   .      .     .                .     .
8019AB7C   PHD$L_WSL              00000000

Step 3

SDA> EVALUATE/PSL @G19AAC4

       CMP TP FPD IS CURMOD PRVMOD IPL DV FU IV T N Z V C
        0   0  0   0  KERN   EXEC   02  0  0  0 0 1 0 0 0
```

Example 2 Using the EVALUATE/PSL Command
(Sheet 2 of 2)

The EVALUATE/PTE Command

The EVALUATE/PTE command interprets and displays the expression as a Page Table Entry (PTE). The individual fields of the PTE are separated and an overall description of the PTE type is provided.

```
SDA> SHOW PAGE G:G600

System page table
-----------------

        ADDRESS       SVAPTE    PTE      TYPE  PROT  BITS PAGTYP

       80000000     801EA200 F8000A34     VALID UR       K
       80000200     801EA204 F8000A35     VALID UR       K
       80000400     801EA208 F8000A36     VALID UR       K


SDA> EVALUATE/PTE F8000A34

|31        28|27        24|23        20|19        16|15
|            |            |            |            |
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+-->
|1 |  1 1 1 1  |0 |--| 0 0 |--| 0|           000A34
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+-->
Vld  Prot= UR    M      Own=K      W          Page Frame Number

       Page is Active and Valid

SDA>
```

Example 3 Using the EVALUATE/PTE Command

The EVALUATE/SYMBOLS Command

The EVALUATE/SYMBOLS command specifies that all symbols that are known to be equal to the evaluated expression are to be displayed.

```
SDA> EVALUATE SCH$GL_CURPCB
Hex = 800021F8   Decimal = -2147474952      SCH$GL_CURPCB
SDA> EVALUATE/SYMBOLS G21F8
Hex = 800021F8   Decimal = -2147474952      SCH$GL_CURPCB
SDA> EVALUATE/SYMBOLS G
Hex = 80000000   Decimal = -2147483648      G
                                            PCB$M_EPID_WILD
                                            PRV$M_SHARE
                                            PSL$M_CM
                                            VA$M_SYSTEM
SDA> EVALUATE/SYMBOLS G14
Hex = 80000014   Decimal = -2147483628      SYS$CALL_HANDL+004
SDA> EVALUATE/SYMBOLS G200
Hex = 80000200   Decimal = -2147483136      SYS$CALL_HANDL+1F0
```

Example 4 Using the EVALUATE/SYMBOLS Command

The EXAMINE/NOSUPPRESS Command

The EXAMINE/NOSUPPRESS command inhibits the suppression of zeros when displaying memory with one of the following qualifiers: /ALL, /P0, /P1, /SYSTEM.

```
SDA> EXAMINE/P0

Process region memory
---------------------

Virtual locations 00000000 through 000001FF are not in physical memory

0130011A 0120011B 0130011E 0110011F  ......0... ...0.     00000200
01200107 02300510 04310216 04210218  ..!...1...0... .     00000210
01100103 01100104 01200105 01200106  .. ... .........     00000220
44412107 01100100 01100101 01100102  .............!AD     00000230
4B202020 20444121 44412106 42582321  !#XB.!AD!AD    K     00000240
00524553 55525055 53434558 454E5245  ERNEXECSUPRUSER.     00000250
53492044 50462050 5420504D 435F2138  8! CMP TP FPD IS     00000260
4920444F 4D565250 20444F4D 52554320   CURMOD PRVMOD I     00000270
204E2054 20564920 55462056 44204C50  PL DV FU IV T N      00000280
00000000 0000005F 212F2143 2056205A  Z V C!/! .......     00000290

Zeros suppressed from 000002A0 through 0000040F

80110AE4 00000000 00108001 80142070  p ..........d...     00000410
00000450 00000450 00000450 00000450  P...P...P...P...     00000420
```

Example 5 Using the EVALUATE/P0 Command

```
SDA> EXAMINE/P0/NOSUPPRESS

Process region memory
---------------------

Virtual locations 00000000 through 000001FF are not in physical memory

0130011A 0120011B 0130011E 0110011F  ......0... ...0.     00000200
01200107 02300510 04310216 04210218  ..!...1...0... .     00000210
01100103 01100104 01200105 01200106  .. ... .........     00000220
44412107 01100100 01100101 01100102  .............!AD     00000230
4B202020 20444121 44412106 42582321  !#XB.!AD!AD    K     00000240
00524553 55525055 53434558 454E5245  ERNEXECSUPRUSER.     00000250
53492044 50462050 5420504D 435F2138  8!_CMP TP FPD IS     00000260
4920444F 4D565250 20444F4D 52554320   CURMOD PRVMOD I     00000270
204E2054 20564920 55462056 44204C50  PL DV FU IV T N      00000280
00000000 0000005F 212F2143 2056205A  Z V C!/!_.......     00000290
00000000 00000000 00000000 00000000  ................     000002A0
00000000 00000000 00000000 00000000  ................     000002B0
   .   .    .   .    .   .   .   .    .   .   .   .          .   .   .
   .   .    .   .    .   .   .   .    .   .   .   .          .   .   .
   .   .    .   .    .   .   .   .    .   .   .   .          .   .   .
00000450 00000450 00000450 00000450  P...P...P...P...     00000420
```

Example 6 Using the EVALUATE/P0/NOSUPPRESS Command

The EXAMINE/PTE Command

The EXAMINE/PTE command interprets and displays the specified longword as a Page Table Entry (PTE). The individual fields of the PTE are separated and an overall description of the PTE type is provided.

```
SDA> SHOW PAGE_TABLE G:G600

System page table
-----------------

       ADDRESS      SVAPTE    PTE       TYPE  PROT    BITS


       80000000     801EA200 F8000A34    VALID UR       K
       80000200     801EA204 F8000A35    VALID UR       K
       80000400     801EA208 F8000A36    VALID UR       K


SDA> EXAMINE/PTE G1EA200

|31        28|27        24|23        20|19        16|15
|            |            |            |            |
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+-->
|1 |  1 1 1 1  |0 |--| 0 0 |--| 0|           000A34
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+-->
Vld  Prot= UR    M      Own=K      W           Page Frame Number

       Page is Active and Valid

SDA> EXAMINE/PTE G1EA204

|31        28|27        24|23        20|19        16|15
|            |            |            |            |
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+-->
|1 |  1 1 1 1  |0 |--| 0 0 |--| 0|           000A35
+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+--+-->
Vld  Prot= UR    M      Own=K      W           Page Frame Number

       Page is Active and Valid
```

Example 7 Using The EXAMINE/PTE Command

The SEARCH/LENGTH Command

SEARCH

/LENGTH=length_specifier

This qualifier specifies the size of the expression value to be used for successful matching during searches of memory. The possible values of this qualifier are:

LONGWORD

Specifies that the expression to be searched for is four bytes in length. This is the default value.

WORD

Specifies that the expression to be searched for is two bytes in length.

BYTE

Specifies that the expression to be searched for is one byte in length.

The SEARCH/STEPS Command

SEARCH

/STEPS=step_factor

This qualifier controls the granularity of searching through the specified memory range. As each comparison of memory occurs, the value of this qualifier determines what the next memory location to be searched will be. The possible stepfactors are:

QUADWORD

Specifies a stepfactor of eight bytes.

LONGWORD

Specifies a stepfactor of four bytes. This is the default value for this qualifier.

WORD

Specifies a stepfactor of two bytes.

BYTE

Specifies a stepfactor of one byte.

Other Comments on SDA

Note that the COPY command releases the dump pages in the paging file so that they are available for system paging. Note that once the COPY command has released the dump pages for paging use, the dump information in these pages may be lost. Subsequent dump analysis should be carried out on the copy of the dump file that was specified in the COPY command.

The SET PROCESS and SHOW PROCESS commands can now include quoted strings in the process name in addition to the previous capital letters, numbers, dollar sign, and underscore.

The SHOW CRASH command register list now includes the system identification register, as shown in Example 8.

```
SDA> SHOW CRASH

System crash information
------------------------
Time of system crash: 19-JAN-1986 14:52:45.45

Version of system: VAX/VMS VERSION V4.4

Process currently executing: MARSH

Current image file: DUA0:[SYS0.][SYSEXE]SDA.EXE;1

Current IPL: 0  (decimal)

General registers:

      R0  = 00000000   R1  = 00000000   R2  = 00000000   R3  = 00000000
      R4  = 00000000   R5  = 00000000   R6  = 00000000   R7  = 00000000
      R8  = 00000000   R9  = 00000000   R10 = 00000000   R11 = 00000000
      AP  = 00000000   FP  = 00000000   SP  = 00000000   PC  = 00000000
      PSL = 00000000

Processor registers:                MicroVAX I

      P0BR   = 00000000      SBR    = 00000000      ASTLVL = 00000000
      P0LR   = 00000000      SLR    = 00000000      SISR   = 00000000
      P1BR   = 00000000      PCBB   = 00000000      ICCS   = 00000000
      P1LR   = 00000000      SCBB   = 00000000      SID    = 07000401

      TODR   = 00000000

      ISP    = 00000000
      KSP    = 00000000
      ESP    = 00000000
      SSP    = 00000000
      USP    = 00000000
```

Example 8 Using the SHOW CRASH Command