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OpenVMS SDA Extensions

DECUS IT-Symposium
VMS 3G04

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19-APR-2007

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OpenVMS SDA Extensions

- What are SDA Extensions ?
- OpenVMS Examples
- Freeware Examples

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SDA ...

- SDA = System Dump Analyzer
  - ANALYZE/CRASH_DUMP – system or process dump
  - ANALYZE/SYSTEM – analyze running system
- Look at and display/format system internal data structures
- OpenVMS System Analysis Tools Manual

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... Extensions

- API for extending SDA
- Available since at least OpenVMS VAX V5.5-2
- API documented since OpenVMS Alpha V7.2 for OpenVMS Alpha and I64 only

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… Extensions

- SDA> *xxx command*
- Invokes SYS$SHARE:xxx$SDA.EXE
  - $ DEFINE xxx$SDA dev:[dir]xxx$SDA.EXE
- SDA> *DO xxx command*
  - Can replace SDA command xxx

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… Extensions

- Executive Debug Images
- SYS$LOADABLE_IMAGES:xxx$DEBUG.EXE
- Dynamically loadable/unloadable – no reboot
- Hooks in OpenVMS executive - xxx$GQ_DEBUG
- Collect trace and debug information
- Shipped with OpenVMS (starting with V7.2-1)

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… Extensions

- Developed and used by OpenVMS engineering
- Ready-to-use, available on-site, no reboot
- Can be used by system analysts
- Tool to examine and format OpenVMS or application internal data structures – without RISK !
- Automate certain SDA tasks

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Generic Commands

- SDA> xxx or xxx HELP
  - display brief HELP for SDA extension xxx

```
SDA> flt
Alignment Fault Tracing Utility FLT commands:
      FLT LOAD
      FLT UNLOAD
      FLT START TRACE [/BUFFER=pages]
                [/BEGIN=pc_range_low] [/END=pc_range_high]
      FLT STOP  TRACE
      FLT SHOW  TRACE [/SUMMARY]
```

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Generic Commands

- SDA> xxx LOAD
  - Loads XXX$DEBUG execlet
- SDA> xxx START TRACE
  - Starts trace function
- SDA> xxx STOP TRACE
  - Stops trace
- SDA> xxx UNLOAD
  - Unloads/disconnects xxx$DEBUG execlet
  - Don't panic, it takes some seconds to complete !

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Generic Commands ...

```
SDA> sym
%CLI-W-SYNTAX, error parsing 'SYM,
SDA> spawn def/job sym$sda dsa64:<tools.sym>sym$sda.exe
SDA> sym
SYM X0.2 (c) 2006, Volker Halle (halle@encompasserve.org) built on VMS V8.2
Symbols for Process PID 3B00138A name SYSTEM

SYM addr  Symbol
--------- ----------------------------------------------
7AD1E598  SNMPI == "$SYS$SYSTEM:TCPIP$SNMPI.EXE"
7AD1D0A8  NDC == "write sys$output "ndc is obsolete; use rndc""
...
```

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WARNING !

- Most of these tools are undocumented, unsupported and subject to change without notice

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Documentation

- OpenVMS System Analysis Tools Manual
  - Chapter 5 SDA CLUE Extension
  - Chapter 6 SDA Alpha OCLA
  - Chapter 7 SDA Alignment Fault Utility (FLT)
  - Chapter 8 SDA Spinlock Tracing Utility (SPL)
  - Chapter 9 SDA Extended File Cache Extension (XFC)
  - Chapter 10 SDA Callable Routines Extension

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OpenVMS Examples

- Source code examples:
- SYS$EXAMPLES:MBX$SDA.C
- SYS$EXAMPLES:RDB$SDA.C and .EXE

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The OpenVMS SDA Extensions

CLUE	V6.2	Crash data extraction
CNX	V7.2-2	Connection Manager
DKLOG	V7.3-1	DK (SCSI class driver)
EXC	V8.2	Exception Handling
FC	V7.2-1	Fibre Channel
FLT	V8.2	Alignment Fault Tracing
IO	V7.3-2	IO subsystem
LAN	V7.2-2	LAN Network Driver

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The OpenVMS SDA Extensions...

▶ LCK	V7.2-1H1	Lock Manager
▶ LNM	V7.3-1	Logical Names
▶ MTX	V7.3-1	Mutex tracing
▶ NET	V7.3-1	DECnet-OSI/-Plus
▶ OCLA	V7.3-2	EV7 On-chip logic analyzer
▶ PCS	V7.3-2	PC Sampling
▶ PE	V7.3	PEdriver (SCS via LAN)
▶ PRF	V8.2 (I64 only)	Performance Tracing

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The OpenVMS SDA Extensions...

▶ PTHREAD	V7.2-1	DECthreads
▶ PSH	V8.2-1	Pshared debug utility
▶ RMS	V8.2-1	RMS indexed file tracing
▶ SPL	V7.2-1H1	Spinlock Tracing
▶ TCPIP	V7.2-1	TCPIP
▶ TQE	V7.3-1	Timer Queue Elements
▶ TR	V7.3-1	Debug Tracing Utility

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The OpenVMS SDA Extensions...

▶ USB	V7.3-1	USB
▶ XFC	V7.3	eXtended File Cache

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PCS – PC Sampling

▶ Where does system/process spend most of it's execution cycles ?

```
SDA> pcs load
PCS$DEBUG load status = 00000001
SDA> pcs start trace
Sampling started...
SDA> pcs stop trace
Sampling stopped...
```

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PCS – PC Sampling

```
SDA> pcs sho trace/stat

PC sampler information:
-----------------------
PC       IPL Pid      Count Routine                          Module
-------- --- -------- ----- -------------------------------- ------
0003001A  0  46C000B1  1154 SYS$K_VERSION_03+0001A           EXAMPLE_7
83ACB832  8  46C000B1     1 TCPIP$INTERNET_SERVICES+03832   TCPIP$INTERNET_SERVICES
805FCF90  8  46C000B1     1 LAN$RETURN_RCV_VCRP_C+00060     SYS$LAN
8015A65C  8  46C000B1     1 AMAC$EMUL_CALL_NATIVE_C+0007C   PROCESS_MANAGEMENT
80921E84  0  46C000B0     1 SCRSHR+21E84                    SCRSHR
8005DD1C  8  46C000B0     1 EXE_STD$KP_STARTIO_C+0009C      SYSTEM_PRIMITIVES_MIN
80012F3C 21  46C000B0     1 IOC$CRAM_IO_C+0007C             SYS$CPU_ROUTINES_0402
001D1832 15  46C000AF     1 TDC$LIBSHR$A_V820-0105+AB832    TDC$LIBSHR$A_V820-0105
80130668  0  46C0009D     1 PROCESS_MANAGEMENT+20668        PROCESS_MANAGEMENT
```

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FLT – Alignment Fault Tracing

```
SDA> flt load
FLT$DEBUG load status = 00000001
SDA> flt start trace
Tracing started...
SDA> flt stop trace
SDA> flt show trace/summ

Fault Trace Information: (at 19-APR-2006 09:10:45.24, trace time
   00:00:01.379162)
------------------------------------------------------------------
   Exception PC    Count
-----------------  ------------ --------------------------------
00000000.0015A8B0  81920
00000000.00176510  81919
00000000.00167F80  40959
```

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FLT – Alignment Fault Tracing...

```
SDA> flt show trace

Unaligned Data Fault Trace Information:
---------------------------------------
Timestamp              CPU  Unaligned VA       Exception PC Access    EPID
---------------------- ---  -----------------  ------------------------------
19-APR 09:10:42.800631  00  00000000.04C5C806  0015A8B0     User      3B000D70
19-APR 09:10:42.800625  00  00000000.04C5C6FA  00176510     User      3B000D70
19-APR 09:10:42.800619  00  00000000.04C5C6EF  0015A8B0     User      3B000D70
19-APR 09:10:42.800615  00  00000000.04C5C6E6  00176510     User      3B000D70
…
SDA> set proc/id=3B000D70
SDA> show proc/ima
Process index: 0070   Name: CHARONVAX         Extended PID: 3B000D70
-------------------------------------------------------------------
              Image Name                    Type       IMCB          GP
------------------------------------ ------------ -------- -----------------
CHARON                                MAIN         7FEB4C80 00000000.00A70000
…
```

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FLT – Alignment Fault Tracing ...

```
SDA> exa/ins 0015A8B0
                { .mib
CHARON+0015A8B0:            ld4         r8 = [r23]
                            nop.i       000000
                            br.many     0000250 ;;
                }
SDA> exa/ins 00176510
                { .mib
CHARON+00176510:            ld4         r8 = [r29]
                            nop.i       000000
                            br.many     1FFF200 ;;
                }
SDA> exa/ins 00167F80
                { .mib
CHARON+00167F80:            ld2         r8 = [r15]
                            nop.i       000000
                            br.many     0000210 ;;

SDA> flt unload
FLT$DEBUG unload status = 00000001
```

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PTHREAD – memory leak

Example: Memory leak in a PTHREAD program

```
SDA> pthread vm
lookaside 0 (32 bytes; obj-name) 585866 in use, 1 free
lookaside 1 (256 bytes; hash-bucket) 187 in use, 0 free
lookaside 2 (384 bytes; rwb, mub, cvb) 586318 in use, 0 free
lookaside 3 (4096 bytes; tsd-array) 0 in use, 0 free
lookaside 4 (4288 bytes; mu-meter) 0 in use, 0 free
lookaside 5 (4352 bytes; cv-meter) 0 in use, 0 free
lookaside 6 (8192 bytes; tcb) 0 in use, 0 free
```

memory used: 32*585866 + 384*586318 = 243893824 = 250 MB

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Examples

- FC – Fibre channel
- LCK – Lock Manager
- IO – IO Subsystem, BUFIO, DIRIO
- LNM – Logical Name Translations
- XFC - eXtended File Cache

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Freeware Examples

- PWAIT$SDA - process wait/hang analysis
- GBLSEC$SDA - global section information
- PF$SDA - Which processes are using a specified pagefile
- LN$SDA – Show process and shared logical names
- PROCIO$SDA - Show process file IO counters
- SYM$SDA - Show process symbols

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Lock Remaster Example

- SDA> cnx start trace/fac=lck/func=remaster
- SDA> cnx start trace /fac=lck/fun=(RM_Req,RM_Complete)
- SDA> CNX SHOW TRACE/FULL
- To view full Resource Names, dump trace buffers: SDA> EXA TraceBuf;D8
- Example

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SDA Extension News

- FC PERFORMANCE available in I64 V8.2-1
- FC SHOW RING/FULL decoder added in VMS732_FIBRE_SCSI-V0800, VMS82I_FIBRE_SCSI-V0200
- FLT START TRACE crash fix in VMS82I_SYS-V0200 and VMS821I_SYS-V0200

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OpenVMS SDA Extensions

- What are SDA Extensions ?
- OpenVMS Examples
- Freeware Examples

Questions ?


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OpenVMS SDA Extensions

SDA Extension	available since	Comment	DEBUG Execlet
AS	V7.3-1	Advanced Server	
CLUE	V6.2	Crash data extraction	
CNX	V7.2-2	Connection Manager	CNX$DEBUG.EXE
CS	V7.3-1	Advanced Server (Common Services)	
DECDTM	V7.2-1	DECdtm	
DKLOG	V7.3-1	DK (SCSI Class Driver)	
EXC	V8.2	Exception Handling	EXC$DEBUG.EXE
FC	V7.2-1	Fibre Channel	
FLT	V8.2	Alignment Fault Tracing	FLT$DEBUG.EXE
FORMS	V7.2-1	DECforms	
IO	V7.3-2	IO subsystem	IO$DEBUG.EXE
IPC	V7.2-1	IPC	
LAN	V7.2-2	LAN Network Driver	
LCK	V7.2-1H1	Lock Manager	LCK$DEBUG.EXE
LES	V7.3-1	LES (DECnet-OSI/-Plus)	
LNM	V7.3-1	Logical names	LNM$DEBUG.EXE
MTX	V7.3-1	Mutex Tracing	MTX$DEBUG.EXE
NET	V7.3-1	DECnet-OSI/-Plus	
NTDS	V7.3-1	NT Disk Services	
OCLA	V7.3-2	EV7 PC Tracing	
PCS	V7.3-2	PC Sampling	PCS$DEBUG.EXE
PE	V7.3	PEdriver (SCS via LAN)	
PKM	V8.2	PKM (LSI53C1030 SCSI Port) A7173A adapter for Integrity	
PRF	V8.2	Performance Tracing (I64 only)	
PSH	V8.2-1	Pshared debug utility (I64 only)	
PTHREAD	V7.2-1	DECthreads	
PWIP	V7.2-1	Pathworks over IP	
PWRK	V7.3-1	Pathworks	
RMS	V8.2-1	RMS indexed file tracing	
SHAD	V8.2	Shadowing	not available
SPL	V7.2-1H1	Spinlock Tracing	SPL$DEBUG.EXE
STREAMS	V7.3-1	Pathworks Streams	
TCPIP	V7.2-1	TCPIP	
TQE	V7.3-1	Timer Queue Elements	TQE$DEBUG.EXE
TR	V7.3-1	generic Trace	TR$DEBUG.EXE
USB	V7.3-1	USB	
X25	V7.3-1	X.25	
XFC	V7.3	eXtended File Cache	

Additional SDA extension examples

```
SYS$EXAMPLES:RDB$SDA.C and .EXE - RDB Utility (V1.0-002)

SYS$EXAMPLES:MBX$SDA.C - Example how to use SDA extensions


SDA extension programming API is supported starting with V7.2

SDA extensions are available on OpenVMS VAX (as far back as at least V5.5-2H4),
but the API is not documented.
```

Ian Miller Freeware :

```
PWAIT$SDA       process wait/hang analysis
GBLSEC$SDA      global section information
PF$SDA          Which process uses which pagefile
LN$SDA          Show logical names
```

Volker Halle - SDA Tools :

```
SYM$SDA         Show process symbols (from dump or running system)
PROCIO$SDA      Example-C How To Use An SDA Extension to Monitor a Process
                (improved and made it work on OpenVMS I64 V8.2)
```

TIMA PROCIO$SDA Example

Official documentation:

OpenVMS System Analysis Tools Manual (V8.2)

Chapter 5 SDA CLUE Extension
Chapter 6 SDA Alpha OCLA
Chapter 7 SDA Alignment Fault Utility (FLT)
Chapter 8 SDA Spinlock Tracing Utility (SPL)
Chapter 9 SDA Extended File Cache Extension (XFC)
Chapter 10 SDA Callable Routines Extension

```
AS

  SHOW

        SHOW

        Syntax : SDA> AS SHOW  [address]

        The SHOW command displays the various fields of a
        structure. The address parameter is the start address
        of the structure. This parameter is required unless
        a symbolic name is used


    Additional information available:

    BCC         CALLOUT    CLIENT_SESSION        COUNTERS   DIALECT    FILE
    PTRMAP      PTRMAP_ENTRY          S          SERVER_SESSION        SESSION
    SHARE_ENTRY           SMB        TASK       TREE       UID_CONTEXT
    UID_ENTRY  UNIXTIME   WORKER_TASK
```

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```
CLUE

  Additional information available:

  CALL_FRAME CLEANUP    CONFIG     CRASH      ERRLOG     FRU        HISTORY
  MCHK       MEMORY     PROCESS    REGISTER   SG         STACK      SYSTEM
  VCC        XQP
```

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```
CNX Utility - Quick Help Information

CNX commands:

        CNX LOAD                    - load CNX$DEBUG execlet
        CNX UNLOAD                  - unload CNX$DEBUG execlet

        CNX START TRACE             - start tracing everything
                  [/BUFFER=n]       - size of trace buffer (in Alpha Pages, default 128 = 1MB)
                  [/FACILITY=n]     - which facility to trace (default = all)
                  [/FUNCTION=n]     - which function to trace (default = all)
        CNX STOP  TRACE             - stop tracing
        CNX SHOW  TRACE             - decode and display trace buffer entries
                  [/FACILITY=n]     - which facility to display (default = all)
                  [/FUNCTION=n]     - which function to display (default = all)
                  [/FULL]           - decode the trace entries into a more verbose mode

        Facility: ALL, CNX, LCK, ACK, LKI, CSP, BLK, CWPS, SLB, LNM, TST, INFO
        Function: ALL, REMASTER, NEWLOCK, GRANTED, DEQ, RMVDIR, BLKING, CVTLCKM, CVTLCKR,
                  REBLDLOCK, TSRQST, SRCHDLCK, DLCKFND, REDO_SRCH, ENTER_DIR, RM_REQ,
                  RM_SHUTDOWN, RM_PREPARE, RM_RBLD_START, RM_RBLD_LOCK, RM_RBLD_DONE,
                  RM_COMPLETE, RM_RESP, 2PCREQ, 2PCRDY, 2PCACK, FATAL, RM_WRTVALBLK, RM_BLOCKXFER

Example:

SDA> cnx load
CNX$DEBUG load status = 00000001
SDA> cnx start trace
Tracing started... (Facility = FFFFFFFF, Function = FFFFFFFF)
SDA> cnx stop trace
Tracing stopped...
SDA> cnx show trace

Connection Manager Message Trace Information:
---------------------------------------------
Timestamp               CSB/CDT   Node      MsgBuf   Seq#  Ack#   RSPID    Facility  Function            TraceBuf          Cr_wt Msg
----------------------  --------  --------  -------  ----  ----  --------  --------  ------------------  ----------------  ----- ---
10-MAY 11:29:30.015409  8839A540 (VAXVMS)  899A21A0  51AA  BC65  00000000  02 LCK    04 Rmvdir           FFFFFFFF.7C277048     0  Tx
10-MAY 11:29:30.015291  883AD180 (AXPVMS)  899A21A0  36E3  4874  00000000  02 LCK    04 Rmvdir           FFFFFFFF.7C276F70     0  Tx
10-MAY 11:29:30.015182  88428D40 (VAXVMS)  88B72AA0  BC65  51A9  216E0016  82 LCK    01 Newlock          FFFFFFFF.7C276E98   780  Rx
10-MAY 11:29:30.013786  8839A540 (VAXVMS)  88A8FFE0  51A9  BC64  216E0016  02 LCK    01 Newlock          FFFFFFFF.7C276DC0     0  Tx
10-MAY 11:29:30.013649  883AD840 (AXPVMS)  88B196E0  4874  36E2  84F3001D  82 LCK    01 Newlock          FFFFFFFF.7C276CE8   467  Rx
```

```
10-MAY 11:29:30.013051  883AD180 (AXPVMS)  88AA10E0  36E2  4873  84F3001D  02 LCK    01 Newlock          FFFFFFFF.7C276C10     0  Tx
10-MAY 11:29:30.012595  8839A540 (VAXVMS)  899A21A0  51A8  BC64  00000000  02 LCK    04 Rmvdir           FFFFFFFF.7C276B38     0  Tx
10-MAY 11:29:30.012505  883AD180 (AXPVMS)  899A21A0  36E1  4873  00000000  02 LCK    04 Rmvdir           FFFFFFFF.7C276A60     0  Tx
10-MAY 11:29:30.012463  883AD840 (AXPVMS)  889420E0  4873  36E0  E2C2000A  82 LCK    01 Newlock          FFFFFFFF.7C276988   467  Rx
10-MAY 11:29:30.011817  883AD180 (AXPVMS)  88C05D20  36E0  4872  E2C2000A  02 LCK    01 Newlock          FFFFFFFF.7C2768B0     0  Tx
10-MAY 11:29:30.001482  883AD180 (AXPVMS)  899A21A0  36DF  4872  00000000  02 LCK    04 Rmvdir           FFFFFFFF.7C2767D8     0  Tx
10-MAY 11:29:29.985951  88428D40 (VAXVMS)  886ABDE0  BC64  51A7  DB900022  82 LCK    01 Newlock          FFFFFFFF.7C276700   780  Rx
10-MAY 11:29:29.984587  8839A540 (VAXVMS)  883C12A0  51A7  BC63  DB900022  02 LCK    01 Newlock          FFFFFFFF.7C276628     0  Tx
10-MAY 11:29:29.984468  883AD840 (AXPVMS)  88B8E0E0  4872  36DE  D093001E  82 LCK    01 Newlock          FFFFFFFF.7C276550   467  Rx
10-MAY 11:29:29.983878  883AD180 (AXPVMS)  88802960  36DE  4871  D093001E  02 LCK    01 Newlock          FFFFFFFF.7C276478     0  Tx
10-MAY 11:29:29.983406  8839A540 (VAXVMS)  899A21A0  51A6  BC63  00000000  02 LCK    04 Rmvdir           FFFFFFFF.7C2763A0     0  Tx
10-MAY 11:29:29.983286  883AD180 (AXPVMS)  899A21A0  36DD  4871  00000000  02 LCK    04 Rmvdir           FFFFFFFF.7C2762C8     0  Tx

SDA>
SDA> cnx unload
CNX$DEBUG unload status = 00000001
```

Example: Tracing Lock Remaster Operations

```
SDA> cnx start trace/fac=lck/func=remaster
SDA> CNX STOP TRACE

SDA> CNX SHOW TRACE     - see below for /FULL output

Timestamp               CSB/CDT   Node      MsgBuf   Seq#  Ack#   RSPID    Facility  Function            TraceBuf          Cr_wt Msg
----------------------  ----------------  --------  ----  ----  --------  --------  ------------------  ----------------- ----- ---
30-OCT 12:58:29.535767  883AD180 (AXPVMS)  888B8EE0  49B7  6F34  1F25001D  82 LCK    15 RM_Resp          FFFFFFFF.7C2776E8     0  Tx
30-OCT 12:58:29.535761  883AD840 (AXPVMS)  888B8EE0  6F34  49B5  1F25001D  02 LCK    14 RM_Complete      FFFFFFFF.7C277610  1202  Rx
30-OCT 12:58:29.535549  883AD180 (AXPVMS)  88A52A60  49B6  6F33  33850035  82 LCK    15 RM_Resp          FFFFFFFF.7C277538     0  Tx
30-OCT 12:58:29.535539  883AD840 (AXPVMS)  88A52A60  6F33  49B5  33850035  02 LCK    14 RM_Complete      FFFFFFFF.7C277460  1202  Rx
30-OCT 12:58:29.468268  883AD180 (AXPVMS)  88883860  49B5  6F32  00000000  02 LCK    13 RM_Rbld_Done     FFFFFFFF.7C277388     0  Tx
30-OCT 12:58:29.468245  883AD840 (AXPVMS)  89A6FB20  6F32  49B4  DB5F0011  82 LCK    15 RM_Resp          FFFFFFFF.7C2771D8  1202  Rx
30-OCT 12:58:29.467508  883AD180 (AXPVMS)  89E8F520  49B4  6F31  DB5F0011  02 LCK    10 RM_Prepare       FFFFFFFF.7C277100     0  Tx
30-OCT 12:58:29.467501  883AD840 (AXPVMS)  89EAB3A0  6F31  49B2  5FE7000C  82 LCK    1B RM_BlockXFER     FFFFFFFF.7C277028  1202  Rx
30-OCT 12:58:29.467303  883AD180 (AXPVMS)  89E14FA0  49B3  6F30  00000000  02 LCK    13 RM_Rbld_Done     FFFFFFFF.7C276F50     0  Tx
30-OCT 12:58:29.467274  883AD840 (AXPVMS)  8892FE60  6F30  49B2  B153001E  82 LCK    15 RM_Resp          FFFFFFFF.7C276DA0  1202  Rx
30-OCT 12:58:29.466423  883AD180 (AXPVMS)  888B8EE0  49B2  6F2F  B153001E  02 LCK    10 RM_Prepare       FFFFFFFF.7C276CC8     0  Tx
30-OCT 12:58:29.466412  883AD840 (AXPVMS)  88EFB8E0  6F2F  49B0  CDB90024  82 LCK    1B RM_BlockXFER     FFFFFFFF.7C276BF0  1202  Rx
30-OCT 12:58:29.465867  883AD180 (AXPVMS)  88A52A60  49B1  6F2E  5FE7000C  02 LCK    1B RM_BlockXFER     FFFFFFFF.7C276B18     0  Tx
30-OCT 12:58:29.465159  883AD180 (AXPVMS)  89EAB3A0  49B0  6F2E  CDB90024  02 LCK    1B RM_BlockXFER     FFFFFFFF.7C276968     0  Tx
30-OCT 12:58:29.464912  883AD840 (AXPVMS)  89E152A0  6F2E  49AE  9141000D  82 LCK    15 RM_Resp          FFFFFFFF.7C2767B8  1202  Rx
30-OCT 12:58:29.464434  883AD840 (AXPVMS)  88AE61E0  6F2D  49AD  47E90015  82 LCK    15 RM_Resp          FFFFFFFF.7C2766E0  1202  Rx
30-OCT 12:58:29.463066  883AD180 (AXPVMS)  88EFB8E0  49AE  6F2B  9141000D  02 LCK    0F RM_Shutdown      FFFFFFFF.7C276530     0  Tx
30-OCT 12:58:29.463063  883AD840 (AXPVMS)  88B23EE0  6F2B  49AB  2EF00003  82 LCK    15 RM_Resp          FFFFFFFF.7C276458  1202  Rx
30-OCT 12:58:29.462835  883AD180 (AXPVMS)  89A6FB20  49AD  6F2A  47E90015  02 LCK    0F RM_Shutdown      FFFFFFFF.7C2762A8     0  Tx
30-OCT 12:58:29.462827  883AD840 (AXPVMS)  89E8E720  6F2A  49AA  A74E0016  82 LCK    15 RM_Resp          FFFFFFFF.7C2761D0  1202  Rx
30-OCT 12:58:29.461843  883AD180 (AXPVMS)  89E8C020  49AB  6F27  2EF00003  02 LCK    0E RM_Req           FFFFFFFF.7C2760F8     0  Tx
30-OCT 12:58:29.461821  883AD180 (AXPVMS)  89E152A0  49AA  6F27  A74E0016  02 LCK    0E RM_Req           FFFFFFFF.7C276020     0  Tx

SDA> eva 7C2760F8-7C276020
Hex = 00000000.000000D8   Decimal = 216         BUG$_DELCONPFN

SDA> exa FFFFFFFF.7C276020 ;D8          Tx RM_Req (tell AXPVMS that a remaster operation is requested)
6F2749AA 88038000 00000002 00000000 89E152A0 883AD180 006CD967 3ED6C6D6  ÖÆÖ>gÙl..Ñ:..Rá.............ªI'o     FFFFFFFF.7C276020
00F90000 00000000 1B00C1C3 3B001687 00000000 01E10001 00000E02 A74E0016  ..N§......á........;ÃÁ........ù.     FFFFFFFF.7C276040
2CB42020 20202020 20315245 53556124 42313146 16000000 00000000 00000000  ............F11B$aUSER1       ´,     FFFFFFFF.7C276060
00000000 00202020 20202020 06000000 00000000 00000000 00200000 00 .....                  .....     FFFFFFFF.7C276080
621C39F3 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ..........................ó9.b     FFFFFFFF.7C2760A0
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000  ................................     FFFFFFFF.7C2760C0
006CD967 3ED7358E 00000000 00000000 00000000 00000000 00000000 00000000  ........................5×>gÙl.     FFFFFFFF.7C2760E0

SDA> exa FFFFFFFF.7C2760F8 ;d8          Tx RM_Req (tell AXPVMS that a remaster operation is requested)
6F2749AB 88038000 00000002 00000000 89E8C020 883AD180 006CD967 3ED7358E  .5×>gÙl..Ñ:. Àè.............«I'o     FFFFFFFF.7C2760F8
00F90000 00000000 1E00C1C3 3B001687 00000000 01E10001 00000E02 2EF00003  ..ð.......á........;ÃÁ........ù.     FFFFFFFF.7C276118
20202020 31524553 55020000 01682CB4 24534D52 1A010000 00000000 00000000  ............RMS$´,h....USER1          FFFFFFFF.7C276138
       X.X;1                ^^^^ (11444,360,0)
00000000 00000000 00000000 06000000 00000000 00000000 00000000 00202020      ................................     FFFFFFFF.7C276158
0040E186 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ..........................á@.     FFFFFFFF.7C276178
00000000 00000000 00000000 00000000 00000000 00000000 00000000 80000000  ................................     FFFFFFFF.7C276198
006CD967 3EEABD04 00000000 00000000 00000000 00000000 00000000 00000000  ........................½ê>gÙl.     FFFFFFFF.7C2761B8

SDA> exa FFFFFFFF.7C2761D0  ;d8         Rx RM_Resp (AXPVMS response)
49AA6F2A 88038000 00000001 000004B2 89E8E720 883AD840 006CD967 3EEABD04  .½ê>gÙl.@Ø:. çè.².....*oªI     FFFFFFFF.7C2761D0
00FA0000 00000000 1B00C1C3 3B001687 00000000 01E10001 00001582 A74E0016  ..N§......á........;ÃÁ........ú.     FFFFFFFF.7C2761F0
2CB42020 20202020 20315245 53556124 42313146 16000000 00000000 00000000  ............F11B$aUSER1       ´,     FFFFFFFF.7C276210
00000000 00202020 20202020 06000000 00000000 00000000 00000000 00000000  ....................       .....     FFFFFFFF.7C276230
621C39F3 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ..........................ó9.b     FFFFFFFF.7C276250
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000  ................................     FFFFFFFF.7C276270
006CD967 3EEAE233 00000000 00000000 00000000 00000000 00000000 00000000  ........................3âê>gÙl.     FFFFFFFF.7C276290

SDA> exa FFFFFFFF.7C2762A8 ;d8          Tx RM_Shutdown (tell AXPVMS to stop activity on this resource tree)
6F2A49AD 88038000 00000002 00000000 89A6FB20 883AD180 006CD967 3EEAE233  3âê>gÙl..Ñ:. û¦.............I*o     FFFFFFFF.7C2762A8
01E10001 000100D9 3F00EAFA 3B001687 00000000 01E10001 00000F02 47E90015  ..éG......á........;úê.?Ù.....á.     FFFFFFFF.7C2762C8
2CB42020 20202020 20315245 53556124 42313146 16000000 00000000 00000000  ............F11B$aUSER1       ´,     FFFFFFFF.7C2762E8
00000000 00202020 53595332 06000000 00000000 00000000 00200000 00 ..................2SYS   .....     FFFFFFFF.7C276308
621C39F3 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ..........................ó9.b     FFFFFFFF.7C276328
00000000 00000000 00000000 00000000 00000000 00000000 00000000 80000000  ................................     FFFFFFFF.7C276348
006CD967 3EEB322A 00000000 00000000 00000000 00000000 00000000 00000000  ........................*2ë>gÙl.     FFFFFFFF.7C276368

SDA> exa FFFFFFFF.7C276458 ;d8          Rx RM_Resp (AXPVMS response)
49AB6F2B 88038000 00000001 000004B2 88B23EE0 883AD840 006CD967 3EEF67AB  «gï>gÙl.@Ø:.à>².².....+o«I     FFFFFFFF.7C276458
00FA0000 00000000 1E00C1C3 3B001687 00000000 01E10001 00001582 2EF00003  ..ð.......á........;ÃÁ........ú.     FFFFFFFF.7C276478
20202020 31524553 55020000 01682CB4 24534D52 1A010000 00000000 00000000  ............RMS$´,h....USER1          FFFFFFFF.7C276498
00000000 00000000 00000000 06000000 00000000 00000000 00000000 00202020      ................................     FFFFFFFF.7C2764B8
0040E186 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ..........................á@.     FFFFFFFF.7C2764D8
00000000 00000000 00000000 00000000 00000000 00000000 00000000 80000000  ................................     FFFFFFFF.7C2764F8
006CD967 3EEF77B3 00000000 00000000 00000000 00000000 00000000 00000000  ........................³wï>gÙl.     FFFFFFFF.7C276518

SDA> exa FFFFFFFF.7C276530  ;d8         Tx RM_Shutdown (tell AXPVMS to shut down activity on this reource tree)
```

```
6F2B49AE 88038000 00000002 00000000 88EFB8E0 883AD180 006CD967 3EEF77B3  ³wï>gÙl..Ñ:.àï............®I+o     FFFFFFFF.7C276530
01E10001 000100D9 3A00C64F 3B001687 00000000 01E10001 00000F02 9141000D  ..A.......á........;OÆ.:Ù.....á.     FFFFFFFF.7C276550
20202020 31524553 55020000 01682CB4 24534D52 1A010000 00000000 00000000  ............RMS$´,h....USER1         FFFFFFFF.7C276570
00000000 00202020 53595332 06000000 00000000 00000000 00202020            ..................2SYS   ....     FFFFFFFF.7C276590
0040E186 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ............................á@.     FFFFFFFF.7C27650
00000000 00000000 00000000 00000000 00000000 00000000 00000000 80000000  ................................     FFFFFFFF.7C2765D0
006CD967 3EEFBDB2 00000000 00000000 00000000 00000000 00000000 00000000  ........................²½ï>gÙl.     FFFFFFFF.7C2765F0

SDA> exa FFFFFFFF.7C2766E0  ;d8          Rx RM_Resp (AXPVMS response)
49AD6F2D 88038000 00000001 000004B2 88AE61E0 883AD840 006CD967 3F0A997C  |..?gÙl.@Ø:.àa®.²...........-oI     FFFFFFFF.7C2766E0
01FA0001 00000000 3F00EAFA 3B001687 00000000 01E10001 00001582 47E90015  ..éG......á........;úê.?......ú.     FFFFFFFF.7C276700
2CB42020 20202020 20315245 53556124 42313146 16000000 00000000 00000000  ............F11B$aUSER1       ´,     FFFFFFFF.7C276720
00000000 00202020 53595332 06000000 00000000 00000000 00000000 00000000  ....................2SYS   .....     FFFFFFFF.7C276740
621C39F3 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ............................ó9.b     FFFFFFFF.7C276760
00000000 00000000 00000000 00000000 00000000 00000000 00000000 80000000  ................................     FFFFFFFF.7C276780
006CD967 3F14161A 00000000 00000000 00000000 00000000 00000000 00000000  ............................?gÙl.     FFFFFFFF.7C2767A0

SDA> exa FFFFFFFF.7C2767B8 ;d8          Rx RM_Resp (AXPVMS response)
49AE6F2E 88038000 00000001 000004B2 89E152A0 883AD840 006CD967 3F14161A  ...?gÙl.@Ø:..Rá.².....o®I     FFFFFFFF.7C2767B8
01FA0001 00000000 3A00C64F 3B001687 00000000 01E10001 00001582 9141000D  ..A.......á........;OÆ.:......ú.     FFFFFFFF.7C2767D8
20202020 31524553 55020000 01682CB4 24534D52 1A010000 00000000 00000000  ............RMS$´,h....USER1         FFFFFFFF.7C2767F8
00000000 00202020 53595332 06000000 00000000 00000000 00202020            ..................2SYS   .....     FFFFFFFF.7C276818
0040E186 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ............................á@.     FFFFFFFF.7C276838
00000000 00000000 00000000 00000000 00000000 00000000 00000000 80000000  ................................     FFFFFFFF.7C276858
006CD967 3F18B112 00000000 00000000 00000000 00000000 00000000 00000000  ............................±.?gÙl.     FFFFFFFF.7C276878

SDA> exa FFFFFFFF.7C276968 ;d8          Tx Block_Xfer (send data to AXPVMS)
6F2E49B0 88038000 00000002 00000000 89EAB3A0 883AD180 006CD967 3F18FCCB  Ëü.?gÙl..Ñ:..³ê.............°I.o     FFFFFFFF.7C276968
00000068 00000000 0000005B 988A000D 7C300805 00000000 00001B02 CDB90024  $.¹Í..........0|....[.......h...     FFFFFFFF.7C276988
53595332 38563436 49020000 000A6F0F 24534D52 1A010000 01E10001 00000000  ......á.....RMS$.o.....I64V82SYS     FFFFFFFF.7C2769A8
00000000 00202020 53595332 06000000 00000000 00000000 00202020            ..................2SYS   .....     FFFFFFFF.7C2769C8
EDA72F7E FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ............................~/§í     FFFFFFFF.7C2769E8
00000000 00000000 00000000 00000000 00000000 00000000 00000000 80000000  ................................     FFFFFFFF.7C276A08
006CD967 3F26E13D 00000000 00000000 00000000 00000000 00000000 00000000  ............................=á&?gÙl.     FFFFFFFF.7C276A28

SDA> exa FFFFFFFF.7C276B18 ;d8          Tx BlockXfer (send data to AXPVMS)
6F2E49B1 88038000 00000002 00000000 88A52A60 883AD180 006CD967 3F2707F1  ñ.'?gÙl..Ñ:.`*¥.............±I.o     FFFFFFFF.7C276B18
00000118 00000000 0000005C 988A000D 30000825 00000000 00001B02 5FE7000C  ..ç_........%..0....\..........     FFFFFFFF.7C276B38
53595332 38563436 49020000 000A6F0F 24534D52 1A010000 01E10001 00000000  ......á.....RMS$.o.....I64V82SYS     FFFFFFFF.7C276B58
00000000 00202020 53595332 06000000 00000000 00000000 00202020            ..................2SYS   .....     FFFFFFFF.7C276B78
EDA72F7E FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ............................~/§í     FFFFFFFF.7C276B98
00000000 00000000 00000000 00000000 00000000 00000000 00000000 80000000  ................................     FFFFFFFF.7C276BB8
006CD967 3F31DA82 00000000 00000000 00000000 00000000 00000000 00000000  ............................Ú1?gÙl.     FFFFFFFF.7C276BD8

SDA> exa FFFFFFFF.7C276BF0 ;d8          Rx BlockXfer (receive response ?)
49B06F2F 88038000 00000001 000004B2 88EFB8E0 883AD840 006CD967 3F31DA82  .Ú1?gÙl.@Ø:.àï.²...........o°I     FFFFFFFF.7C276BF0
00000000 00000000 0000005B 00000000 00000000 82971530 00001B82 CDB90024  $.¹Í....0...........[...........     FFFFFFFF.7C276C10
01E10001 00000000 00000068 00000000 0000005B 988A000D 7C300805 00000001  ......0|....[.......h.........á.     FFFFFFFF.7C26C30
00000000 00202020 53595332 38563436 49020000 000A6F0F 24534D52 1A010000  ....RMS$.o.....I64V82SYS   .....     FFFFFFFF.7C27650
00000000 00000000 00000000 00202020 53595332 06000000 00000000 00000000  ............2SYS   .............     FFFFFFFF.7C276C70
00000000 00000000 EDA72F7E FFFFFFFF 00000000 FFFFFFFF 00000000 00000000  ....................~/§í........     FFFFFFFF.7C276C90
006CD967 3F321166 00000000 00000000 00000000 00000000 00000000 00000000  ........................f.2?gÙl.     FFFFFFFF.7C276CB0

SDA> exa FFFFFFFF.7C276CC8 ;d8          Tx RM_Prepare
6F2F49B2 88038000 00000002 00000000 888B8EE0 883AD180 006CD967 3F321166  f.2?gÙl..Ñ:.à..............²I/o     FFFFFFFF.7C276CC8
00F90000 00000000 17000EC2 3B001687 00000000 01E10001 00001002 B153001E  ..S±......á........;Â.........ù.     FFFFFFFF.7C276CE8
2CB42020 20202020 20315245 53556124 42313146 16000000 00000000 00000000  ............F11B$aUSER1       ´,     FFFFFFFF.7C276D08
00000000 00202020 53595332 06000000 00000000 00000000 00200000 00000000  .. ................2SYS   .....     FFFFFFFF.7C276D28
621C39F3 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ............................ó9.b     FFFFFFFF.7C276D48
00000000 00000000 00000000 00000000 00000000 00000000 00000000 80000000  ................................     FFFFFFFF.7C276D68
006CD967 3F42F21B 00000000 00000000 00000000 00000000 00000000 00000000  ............................òB?gÙl.     FFFFFFFF.7C276D88

SDA> exa FFFFFFFF.7C276DA0 ;d8          Rx RM_Resp
49B26F30 88038000 00000001 000004B2 8892FE60 883AD840 006CD967 3F42F21B  .òB?gÙl.@Ø:.`þ..².....0o²I     FFFFFFFF.7C276DA0
00FA0000 00000000 17000EC2 3B001687 00000000 01E10001 00001582 B153001E  ..S±......á........;Â.........ú.     FFFFFFFF.7C276DC0
2CB42020 20202020 20315245 53556124 42313146 16000000 00000000 00000000  ............F11B$aUSER1       ´,     FFFFFFFF.7C276DE0
00000000 00202020 53595332 06000000 00000000 00000000 00000000 00000000  ....................2SYS   .....     FFFFFFFF.7C276E00
621C39F3 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00000000 00000000  ............................ó9.b     FFFFFFFF.7C276E20
00000000 00000000 00000000 00000000 00000000 00000000 00000000 80000000  ................................     FFFFFFFF.7C276E40
006CD967 3F431DCD 00000000 00000000 00000000 00000000 00000000 00000000  ........................Í.C?gÙl.     FFFFFFFF.7C276E60

SDA> exa FFFFFFFF.7C276F50  ;d8          Tx Rbld_Done
6F3049B3 88038000 00000002 00000000 89E14FA0 883AD180 006CD967 3F4382BD  ½.C?gÙl..Ñ:..Oá.............³I0o     FFFFFFFF.7C276F50
61616161 61610002 61616161 61616161 61616161 01E10001 00001302 00000000  ..........á.aaaaaaaaaaaa..aaaaaa     FFFFFFFF.7C276F70
2CB42020 20202020 20315245 53556124 42313146 16000000 00000000 00000000  ............F11B$aUSER1       ´,     FFFFFFFF.7C276F90
61616161 61616161 61616161 61616161 61616161 61616161 61616161 61610000  ..aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa     FFFFFFFF.7C276FB0
621C39F3 61616161 61616161 61616161 61616161 61616161 61616161 61616161  aaaaaaaaaaaaaaaaaaaaaaaaaaaaó9.b     FFFFFFFF.7C276FD0
61616161 61616161 61616161 61616161 61616161 61616161 61616161 61616161  aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa     FFFFFFFF.7C276FF0
006CD967 3F477110 00000000 61616161 61616161 61616161 61616161 61616161  aaaaaaaaaaaaaaaaaaaa.....qG?gÙl.     FFFFFFFF.7C277010

SDA> exa FFFFFFFF.7C277028  ;d8          Rx RM_BlockXfer
49B26F31 88038000 00000001 000004B2 89EAB3A0 883AD840 006CD967 3F477110  .qG?gÙl.@Ø:..³ê.².....1o²I     FFFFFFFF.7C277028
00000000 00000000 0000005C 28001E17 00000000 82971530 00001B82 5FE7000C  ..ç_....0.........(\..........     FFFFFFFF.7C277048
01E10001 00000000 00000118 00000000 0000005C 988A000D 30000825 00000001  ....%..0....\.............á.     FFFFFFFF.7C277068
00000000 00202020 53595332 38563436 49020000 000A6F0F 24534D52 1A010000  ....RMS$.o.....I64V82SYS   .....     FFFFFFFF.7C277088
00000000 00000000 00000000 00202020 53595332 06000000 00000000 00000000  ............2SYS   .............     FFFFFFFF.7C2770A8
00000000 00000000 EDA72F7E FFFFFFFF 00000000 FFFFFFFF 00000000 00000000  ....................~/§í........     FFFFFFFF.7C2770C8
006CD967 3F479354 00000000 00000000 00000000 00000000 00000000 00000000  ........................T.G?gÙl.     FFFFFFFF.7C2770E8

SDA> exa FFFFFFFF.7C277100  ;d8          Tx RM_Prepare
6F3149B4 88038000 00000002 00000000 89E8F520 883AD180 006CD967 3F479354  T.G?gÙl..Ñ:. õè.............´I1o     FFFFFFFF.7C277100
00F90000 00000000 5C004A55 3B00011A 00000000 01E10001 00001002 DB5F0011  .._Û......á........;UJ.\......ù.     FFFFFFFF.7C277120
20202020 31524553 55020000 01682CB4 24534D52 1A010000 00000000 00000000  ............RMS$´,h....USER1         FFFFFFFF.7C277140
00000000 00202020 53595332 06000000 00000000 00000000 00202020            ..................2SYS   .....     FFFFFFFF.7C277160
0040E186 FFFFFFFF 00000000 0000B9EF 20202020 00000000 00000000 00000000  ............    ï¹..........á@.     FFFFFFFF.7C277180
00000000 00000000 EDA72F7E FFFFFFFF 00000000 FFFFFFFF 00000000 00000000  ....................~/§í........     FFFFFFFF.7C2771A0
006CD967 3F5632D0 00000000 00000000 00000000 00000000 00000000 00000000  ........................Ð2V?gÙl.     FFFFFFFF.7C2771C0

SDA> exa FFFFFFFF.7C2771D8  ;d8          Rx RM_Resp
49B46F32 88038000 00000001 000004B2 89A6FB20 883AD840 006CD967 3F5632D0  Ð2V?gÙl.@Ø:. û¦.².....2o´I     FFFFFFFF.7C2771D8
00FA0000 00000000 5C004A55 3B00011A 00000000 01E10001 00001582 DB5F0011  .._Û......á........;UJ.\......ú.     FFFFFFFF.7C2771F8
20202020 31524553 55020000 01682CB4 24534D52 1A010000 00000000 00000000  ............RMS$´,h....USER1         FFFFFFFF.7C277218
```

```
00000000 00202020 53595332 06000000 00000000 00000000 00000000 00202020     ................2SYS   .....     FFFFFFFF.7C277238
0040E186 FFFFFFFF 00000000 0000B9EF 20202020 00000000 00000000 00000000  ............    ï¹..........á@.     FFFFFFFF.7C277258
00000000 00000000 EDA72F7E FFFFFFFF 00000000 FFFFFFFF 00000000 00000000  ....................~/§í........     FFFFFFFF.7C277278
006CD967 3F565748 00000000 00000000 00000000 00000000 00000000 00000000  ........................HWV?gÙl.     FFFFFFFF.7C277298
SDA> exa FFFFFFFF.7C277388 ;d8
6F3249B5 88038000 00000002 00000000 88883860 883AD180 006CD967 3F56A8AD  ¨V?gÙl..Ñ:.`8.............µI2o     FFFFFFFF.7C277388
61616161 61610002 61616161 61616161 61616161 01E10001 00001302 00000000  ..........á.aaaaaaaaaaaa..aaaaaa     FFFFFFFF.7C2773A8
20202020 31524553 55020000 01682CB4 24534D52 1A010000 00000000 00000000  ............RMS$´,h....USER1         FFFFFFFF.7C2773C8
61616161 61616161 61616161 61616161 61616161 61616161 61610000 00202020     ...aaaaaaaaaaaaaaaaaaaaaaaaa     FFFFFFFF.7C2773E8
0040E186 61616161 61616161 61616161 61616161 61616161 61616161 61616161  aaaaaaaaaaaaaaaaaaaaaaaaaaaaa.á@.     FFFFFFFF.7C277408
61616161 61616161 61616161 61616161 61616161 61616161 61616161 61616161  aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa     FFFFFFFF.7C277428
006CD967 448D145E 00000000 61616161 61616161 61616161 61616161 61616161  aaaaaaaaaaaaaaaaaaaa....^..DgÙl.     FFFFFFFF.7C277448
SDA> exa FFFFFFFF.7C277460  ;d8
49B56F33 88038000 00000001 000004B2 88A52A60 883AD840 006CD967 448D145E  ^..DgÙl.@Ø:.`*¥.².....3oµI     FFFFFFFF.7C277460
00FA0000 00000010 22000D37 7C011C3C 00003C4E 01E10001 00001402 33850035  5..3.....á.N<..<..|7.."......ú.     FFFFFFFF.7C277480
2CB42020 20202020 20315245 53556124 42313146 16000000 00000000 00000000  ............F11B$aUSER1       ´,     FFFFFFFF.7C2774A0
00000000 00000000 00000000 00000010 00000000 00000000 00000000 00000000  ................................     FFFFFFFF.7C2774C0
621C39F3 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 000581BD 00000000  ....½.....................ó9.b     FFFFFFFF.7C2774E0
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000  ................................     FFFFFFFF.7C277500
006CD967 448D454B 00000000 00000000 00000000 00000000 00000000 00000000  ........................KE.DgÙl.     FFFFFFFF.7C277520
SDA> exa FFFFFFFF.7C277538  ;d8
6F3349B6 88038000 00000002 00000000 88A52A60 883AD180 006CD967 448D454B  KE.DgÙl..Ñ:.`*¥.............¶I3o     FFFFFFFF.7C277538
00FA0000 00000010 22000D37 7C011C3C 00003C4E 01E10001 00001582 33850035  5..3.....á.N<..<..|7.."......ú.     FFFFFFFF.7C277558
2CB42020 20202020 20315245 53556124 42313146 16000000 00000000 00000000  ............F11B$aUSER1       ´,     FFFFFFFF.7C277578
00000000 00000000 00000000 00000010 00000000 00000000 00000000 00000000  ................................     FFFFFFFF.7C277598
621C39F3 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 000581BD 00000000  ....½.....................ó9.b     FFFFFFFF.7C2775B8
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000  ................................     FFFFFFFF.7C2775D8
006CD967 44917A87 00000000 00000000 00000000 00000000 00000000 00000000  ........................z.DgÙl.     FFFFFFFF.7C2775F8
SDA> exa FFFFFFFF.7C277610 ;d8
49B56F34 88038000 00000001 000004B2 888B8EE0 883AD840 006CD967 44917A87  .z.DgÙl.@Ø:.à...².....4oµI     FFFFFFFF.7C277610
00FA0000 00000010 47000BFA 28001E17 00003C4E 01E10001 00001402 1F25001D  ..ú.....á.N<.....(ú..G.....ú.     FFFFFFFF.7C277630
20202020 31524553 55020000 01682CB4 24534D52 1A010000 00000000 00000000  ............RMS$´,h....USER1         FFFFFFFF.7C277650
00000000 00000000 00000000 00000010 00000000 00000000 00000000 00202020     ................................     FFFFFFFF.7C277670
0040E186 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00003ABF 00000000  ....¿:.....................á@.     FFFFFFFF.7C277690
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000  ................................     FFFFFFFF.7C2776B0
006CD967 4491974B 00000000 00000000 00000000 00000000 00000000 00000000  ........................K..DgÙl.     FFFFFFFF.7C2776D0
SDA> exa FFFFFFFF.7C2776E8 ;d8
6F3449B7 88038000 00000002 00000000 888B8EE0 883AD180 006CD967 4491974B  K..DgÙl..Ñ:.à.............·I4o     FFFFFFFF.7C2776E8
00FA0000 00000010 47000BFA 28001E17 00003C4E 01E10001 00001582 1F25001D  ..ú.....á.N<.....(ú..G.....ú.     FFFFFFFF.7C277708
20202020 31524553 55020000 01682CB4 24534D52 1A010000 00000000 00000000  ............RMS$´,h....USER1         FFFFFFFF.7C277728
00000000 00000000 00000000 00000010 00000000 00000000 00000000 00202020     ................................     FFFFFFFF.7C277748
0040E186 FFFFFFFF 00000000 FFFFFFFF 00000000 00000000 00003ABF 00000000  ....¿:.....................á@.     FFFFFFFF.7C277768
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000  ................................     FFFFFFFF.7C277788
00000000 DEADDEAD 00000000 00000000 00000000 00000000 00000000 00000000  ........................ÞÞ....     FFFFFFFF.7C2777A8
```

```
SDA> CNX SHOW TRACE/FULL

Timestamp                CSB/CDT   Node      MsgBuf   Seq#  Ack#   RSPID    Facility  Function            TraceBuf          Cr_wt Msg
-----------------------  ----------------  --------  ----  ----  --------  --------  ------------------  ----------------- ----- ---
30-OCT 12:58:29.535767  883AD180 (AXPVMS)  888B8EE0  49B7  6F34  1F25001D  82 LCK    15 RM_Resp          FFFFFFFF.7C2776E8     0  Tx
                                    State     -6 RspGrantd

30-OCT 12:58:29.535761  883AD840 (AXPVMS)  888B8EE0  6F34  49B5  1F25001D  02 LCK    14 RM_Complete      FFFFFFFF.7C277610  1202  Rx
                                    ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 12:58:29.535549  883AD180 (AXPVMS)  88A52A60  49B6  6F33  33850035  82 LCK    15 RM_Resp          FFFFFFFF.7C277538     0  Tx
                                    State     -6 RspGrantd

30-OCT 12:58:29.535539  883AD840 (AXPVMS)  88A52A60  6F33  49B5  33850035  02 LCK    14 RM_Complete      FFFFFFFF.7C277460  1202  Rx
                                    ParMstLKID 00000000   HashVal 621C39F3    Resnam "F11B$aUSER1       ´,.."

30-OCT 12:58:29.468268  883AD180 (AXPVMS)  88883860  49B5  6F32  00000000  02 LCK    13 RM_Rbld_Done     FFFFFFFF.7C277388     0  Tx
                                    Exp_Done       0002
                                    ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 12:58:29.468252  8839A540 (VAXVMS)  89064C20  7DE4  9B83  00000000  02 LCK    11 RM_Rbld_Start    FFFFFFFF.7C2772B0     0  Tx
                                    ParMstLKID 00000000   HashVal 61616161    Resnam "RMS$´,h....USER1       ..."

30-OCT 12:58:29.468245  883AD840 (AXPVMS)  89A6FB20  6F32  49B4  DB5F0011  82 LCK    15 RM_Resp          FFFFFFFF.7C2771D8  1202  Rx
                                    State     -6 RspGrantd

30-OCT 12:58:29.467508  883AD180 (AXPVMS)  89E8F520  49B4  6F31  DB5F0011  02 LCK    10 RM_Prepare       FFFFFFFF.7C277100     0  Tx
                                    ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 12:58:29.467501  883AD840 (AXPVMS)  89EAB3A0  6F31  49B2  5FE7000C  82 LCK    1B RM_BlockXFER     FFFFFFFF.7C277028  1202  Rx

30-OCT 12:58:29.467303  883AD180 (AXPVMS)  89E14FA0  49B3  6F30  00000000  02 LCK    13 RM_Rbld_Done     FFFFFFFF.7C276F50     0  Tx
                                    Exp_Done       0002
                                    ParMstLKID 00000000   HashVal 621C39F3    Resnam "F11B$aUSER1       ´,.."

30-OCT 12:58:29.467283  8839A540 (VAXVMS)  89064C20  7DE3  9B83  00000000  02 LCK    11 RM_Rbld_Start    FFFFFFFF.7C276E78     0  Tx
                                    ParMstLKID 00000000   HashVal 61616161    Resnam "F11B$aUSER1       ´,.."

30-OCT 12:58:29.467274  883AD840 (AXPVMS)  8892FE60  6F30  49B2  B153001E  82 LCK    15 RM_Resp          FFFFFFFF.7C276DA0  1202  Rx
                                    State     -6 RspGrantd

30-OCT 12:58:29.466423  883AD180 (AXPVMS)  888B8EE0  49B2  6F2F  B153001E  02 LCK    10 RM_Prepare       FFFFFFFF.7C276CC8     0  Tx
                                    ParMstLKID 00000000   HashVal 621C39F3    Resnam "F11B$aUSER1       ´,.."

30-OCT 12:58:29.466412  883AD840 (AXPVMS)  88EFB8E0  6F2F  49B0  CDB90024  82 LCK    1B RM_BlockXFER     FFFFFFFF.7C276BF0  1202  Rx

30-OCT 12:58:29.465867  883AD180 (AXPVMS)  88A52A60  49B1  6F2E  5FE7000C  02 LCK    1B RM_BlockXFER     FFFFFFFF.7C276B18     0  Tx
         RMblkseq 000000000000005C   BXfer_Size 00000118

30-OCT 12:58:29.465859  89E4DFC0 (VAXVMS)  88C04B20  9B83  7DE2  48B7000E  82 LCK    15 RM_Resp          FFFFFFFF.7C276A40     0  Rx
                                    State     -6 RspGrantd

30-OCT 12:58:29.465159  883AD180 (AXPVMS)  89EAB3A0  49B0  6F2E  CDB90024  02 LCK    1B RM_BlockXFER     FFFFFFFF.7C276968     0  Tx
         RMblkseq 000000000000005B   BXfer_Size 00000068

30-OCT 12:58:29.465144  89E4DFC0 (VAXVMS)  89E8C020  9B82  7DE1  4B1D0012  82 LCK    15 RM_Resp          FFFFFFFF.7C276890     0  Rx
```

```
                                    State     -6 RspGrantd

30-OCT 12:58:29.464912  883AD840 (AXPVMS)  89E152A0  6F2E  49AE  9141000D  82 LCK    15 RM_Resp          FFFFFFFF.7C2767B8  1202  Rx
                                    State     -6 RspGrantd

30-OCT 12:58:29.464434  883AD840 (AXPVMS)  88AE61E0  6F2D  49AD  47E90015  82 LCK    15 RM_Resp          FFFFFFFF.7C2766E0  1202  Rx
                                    State     -6 RspGrantd

30-OCT 12:58:29.463080  8839A540 (VAXVMS)  89E9F6A0  7DE2  9B81  48B7000E  02 LCK    0F RM_Shutdown      FFFFFFFF.7C276608     0  Tx
                                  ParMstLKID 00000000   HashVal 00000000    Resnam "RMS$´,h....USER1       ..."

30-OCT 12:58:29.463066  883AD180 (AXPVMS)  88EFB8E0  49AE  6F2B  9141000D  02 LCK    0F RM_Shutdown      FFFFFFFF.7C276530     0  Tx
                                  ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 12:58:29.463063  883AD840 (AXPVMS)  88B23EE0  6F2B  49AB  2EF00003  82 LCK    15 RM_Resp          FFFFFFFF.7C276458  1202  Rx
                                    State     -6 RspGrantd

30-OCT 12:58:29.462850  8839A540 (VAXVMS)  88C04B20  7DE1  9B81  4B1D0012  02 LCK    0F RM_Shutdown      FFFFFFFF.7C276380     0  Tx
                                  ParMstLKID 00000000   HashVal 00000000    Resnam "FI1B$aUSER1      ´,.."

30-OCT 12:58:29.462835  883AD180 (AXPVMS)  89A6FB20  49AD  6F2A  47E90015  02 LCK    0F RM_Shutdown      FFFFFFFF.7C2762A8     0  Tx
                                  ParMstLKID 00000000   HashVal 621C39F3    Resnam "FI1B$aUSER1      ´,.."

30-OCT 12:58:29.462827  883AD840 (AXPVMS)  89E8E720  6F2A  49AA  A74E0016  82 LCK    15 RM_Resp          FFFFFFFF.7C2761D0  1202  Rx
                                    State     -6 RspGrantd

30-OCT 12:58:29.461843  883AD180 (AXPVMS)  89E8C020  49AB  6F27  2EF00003  02 LCK    0E RM_Req           FFFFFFFF.7C2760F8     0  Tx
                                  ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 12:58:29.461821  883AD180 (AXPVMS)  89E152A0  49AA  6F27  A74E0016  02 LCK    0E RM_Req           FFFFFFFF.7C276020     0  Tx
                                  ParMstLKID 00000000   HashVal 621C39F3    Resnam "FI1B$aUSER1      ´,.."
```

Example: Specifically Tracing Lock Remaster-Request and Remaster-Complete

```
SDA> cnx start trace/fac=lck/fun=(RM_Req,RM_Complete)
Tracing started... (Facility = 00000004, Function = 00104000)

SDA> CNX SHOW TRACE/FULL

Timestamp               CSB/CDT   Node      MsgBuf   Seq#  Ack#   RSPID    Facility  Function            TraceBuf          Cr_wt Msg
----------------------  ----------------  --------  ----  ----  --------  --------  ------------------  ----------------- ----- ---
30-OCT 14:21:39.148648  883AD840 (AXPVMS)  88EFB8E0  4844  EB5C  8AC30035  02 LCK    14 RM_Complete      FFFFFFFF.7C277538  1202  Rx
                                  ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 14:21:39.101294  883AD840 (AXPVMS)  89E920A0  4843  EB5B  B4740032  02 LCK    14 RM_Complete      FFFFFFFF.7C277460  1202  Rx
                                  ParMstLKID 00000000   HashVal 621C39F3    Resnam "FI1B$aUSER1      ´,.."

30-OCT 14:21:39.093664  883AD180 (AXPVMS)  88B23EE0  EB53  483A  76260026  02 LCK    0E RM_Req           FFFFFFFF.7C277388     0  Tx
                                  ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 14:21:39.093636  883AD180 (AXPVMS)  88BE47A0  EB52  483A  63B9000C  02 LCK    0E RM_Req           FFFFFFFF.7C2772B0     0  Tx
                                  ParMstLKID 00000000   HashVal 621C39F3    Resnam "FI1B$aUSER1      ´,.."

30-OCT 14:21:12.903070  8839A540 (VAXVMS)  883A7360  97E1  ACE9  BCD0002B  02 LCK    14 RM_Complete      FFFFFFFF.7C2771D8     0  Tx
                                  ParMstLKID 00000000   HashVal 00000000    Resnam "RMS$´,h....USER1       ..."

30-OCT 14:21:12.903052  883AD180 (AXPVMS)  88AEFCA0  EB30  481F  9512000D  02 LCK    14 RM_Complete      FFFFFFFF.7C277100     0  Tx
                                  ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 14:21:12.792795  883AD180 (AXPVMS)  89E8E720  EB2C  4819  4BBA0015  02 LCK    14 RM_Complete      FFFFFFFF.7C277028     0  Tx
                                  ParMstLKID 00000000   HashVal 64894CAF    Resnam "FI1B$aUSER1       ï¹.."

30-OCT 14:21:12.792472  8839A540 (VAXVMS)  89E90520  97E0  ACE7  4B9B000E  02 LCK    14 RM_Complete      FFFFFFFF.7C276F50     0  Tx
                                  ParMstLKID 00000000   HashVal 00000000    Resnam "FI1B$aUSER1      ´,.."

30-OCT 14:21:12.792457  883AD180 (AXPVMS)  89EAB3A0  EB2B  4818  32C10003  02 LCK    14 RM_Complete      FFFFFFFF.7C276E78     0  Tx
                                  ParMstLKID 00000000   HashVal 621C39F3    Resnam "FI1B$aUSER1      ´,.."

30-OCT 14:21:12.784845  883AD840 (AXPVMS)  88B23EE0  480D  EB1B  B46F0032  02 LCK    0E RM_Req           FFFFFFFF.7C276DA0  1202  Rx
                                  ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 14:21:12.784599  883AD840 (AXPVMS)  88C04B20  480C  EB1B  765D001D  02 LCK    0E RM_Req           FFFFFFFF.7C276CC8  1202  Rx
                                  ParMstLKID 00000000   HashVal 621C39F3    Resnam "FI1B$aUSER1      ´,.."

30-OCT 14:21:12.784374  883AD840 (AXPVMS)  89E8C020  480B  EB1B  8ABD0035  02 LCK    0E RM_Req           FFFFFFFF.7C276BF0  1202  Rx
                                  ParMstLKID 00000000   HashVal 64894CAF    Resnam "FI1B$aUSER1       ï¹.."

30-OCT 14:20:35.055714  883AD840 (AXPVMS)  88980CE0  2AFB  B134  B46B0032  02 LCK    14 RM_Complete      FFFFFFFF.7C276B18  1202  Rx
                                  ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 14:20:35.028350  883AD840 (AXPVMS)  88859660  2AFA  B133  7659001D  02 LCK    14 RM_Complete      FFFFFFFF.7C276A40  1202  Rx
                                  ParMstLKID 00000000   HashVal 621C39F3    Resnam "FI1B$aUSER1      ´,.."

30-OCT 14:20:35.020717  883AD180 (AXPVMS)  886A2860  B12A  2AEF  48820015  02 LCK    0E RM_Req           FFFFFFFF.7C276968     0  Tx
                                  ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 14:20:35.020695  883AD180 (AXPVMS)  88BE47A0  B129  2AEF  2F890003  02 LCK    0E RM_Req           FFFFFFFF.7C276890     0  Tx
                                  ParMstLKID 00000000   HashVal 621C39F3    Resnam "FI1B$aUSER1      ´,.."

30-OCT 14:19:38.962226  883AD840 (AXPVMS)  89E8F720  8458  DDC1  55E70035  02 LCK    14 RM_Complete      FFFFFFFF.7C2767B8  1202  Rx
                                  ParMstLKID 00000000   HashVal 64894CAF    Resnam "FI1B$aUSER1       ï¹.."

30-OCT 14:19:38.956700  883AD180 (AXPVMS)  8892FE60  DDB9  844A  2F870003  02 LCK    0E RM_Req           FFFFFFFF.7C2766E0     0  Tx
                                  ParMstLKID 00000000   HashVal 64894CAF    Resnam "FI1B$aUSER1       ï¹.."

30-OCT 14:19:04.641763  8839A540 (VAXVMS)  88721C20  972E  AC61  4DEE0012  02 LCK    14 RM_Complete      FFFFFFFF.7C276608     0  Tx
                                  ParMstLKID 00000000   HashVal 00000000    Resnam "RMS$´,h....USER1       ..."

30-OCT 14:19:04.641750  883AD180 (AXPVMS)  886DE020  5C40  8184  607C000C  02 LCK    14 RM_Complete      FFFFFFFF.7C276530     0  Tx
                                  ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."
```

```
30-OCT 14:19:04.639208  8839A540 (VAXVMS)  88980CE0  972D  AC60  8BEE0019  02 LCK    14 RM_Complete      FFFFFFFF.7C276458     0  Tx
                                  ParMstLKID 00000000   HashVal 00000000    Resnam "F11B$aUSER1       ´,.."

30-OCT 14:19:04.639194  883AD180 (AXPVMS)  8871B620  5C3D  8180  B1E8001E  02 LCK    14 RM_Complete      FFFFFFFF.7C276380     0  Tx
                                  ParMstLKID 00000000   HashVal 621C39F3    Resnam "F11B$aUSER1       ´,.."

30-OCT 14:19:04.623867  883AD180 (AXPVMS)  8897CC60  5C38  817A  CE4E0024  02 LCK    14 RM_Complete      FFFFFFFF.7C2762A8     0  Tx
                                  ParMstLKID 00000000   HashVal 64894CAF    Resnam "F11B$aUSER1       ï¹.."

30-OCT 14:19:04.619609  883AD840 (AXPVMS)  88859660  8173  5C2C  212B001D  02 LCK    0E RM_Req           FFFFFFFF.7C2761D0  1202  Rx
                                  ParMstLKID 00000000   HashVal 0040E186    Resnam "RMS$´,h....USER1       ..."

30-OCT 14:19:04.619344  883AD840 (AXPVMS)  89E920A0  8172  5C2C  358B0035  02 LCK    0E RM_Req           FFFFFFFF.7C2760F8  1202  Rx
                                  ParMstLKID 00000000   HashVal 621C39F3    Resnam "F11B$aUSER1       ´,.."

30-OCT 14:19:04.619120  883AD840 (AXPVMS)  89DFB620  8171  5C2C  1E180034  02 LCK    0E RM_Req           FFFFFFFF.7C276020  1202  Rx
                                  ParMstLKID 00000000   HashVal 64894CAF    Resnam "F11B$aUSER1       ï¹.."
```

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CS

SHOW

SHOW

Syntax : SDA> CS SHOW [address]

The SHOW command displays the various fields of a structure. The address parameter is the start address of the structure. This parameter is required unless a symbolic name is used

Additional information available:

BDSC	CHUNKHDR	DIR_BLOCK_HEADER	DIR_CACHE_ENTRY
DIR_CACHE_FILE	DIR_CACHE_HEADER	DIR_CONTEXT	
FID_CACHE_ENTRY	FID_CACHE_HEADER	FILE	FILE_PATH_BLOCK
FPB_TABLE_ENTRY	IOSUSP	LIBMEM	LIB_POOL
LIB_POOL_ELEMENT	PATH_CACHE_ENTRY	PATH_CACHE_HEADER	PERF_SERVER_INFO
PIPEEND	PLM_HEADER THREAD	THREAD_FORK_BLOCK	THREAD_STACK_DATA
TSV	USTRUCT	VOLUME	WORKQ_QUEUE
WORKQ_STALL_ELEMENT	WORKQ_WORK_ELEMENT		

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```
%HELP-E-OPENIN, error opening SYS$COMMON:[SYSHLP]DECDTM$SDA_HELP.HLB; as input
-RMS-E-FNF, file not found
```

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```
DKLOG command format:
  DKLOG SHOW  {<devnam>|/ADDRESS=} [/DIRECTION=[FORWARD|BACKWARD(D)]
  DKLOG START {<devnam>|/ADDRESS=}[/ENTRIES=[|128(D)]
  DKLOG STOP  {<devnam>|/ADDRESS=}
  DKLOG CLEAR {<devnam>|/ADDRESS=}
  <devnam> acts on all matching device UCBs,  acts on a single UCB.

Example:

SDA> dklog start dka0
Starting logging on specified device(s)...
... completed after 1 UCB with 0 no-buffer errors
SDA> dklog stop
%CLI-W-CONFLICT, illegal combination of command elements - check documentation
 \NOP1\
SDA> dklog stop dka0
Stopping logging on specified device(s)...
... completed after 1 UCB with 0 no-buffer errors
SDA> dklog show dka0

DKDRIVER I/O Logging
--------------------

Device Name       UCB Addr Path name                  Entries Oldest Entry
-------------------------------------------------------------------------
$64$DKA0          8821EF80 PKA0.0                        128   11:44:23.72

Time        Log Point         I/O Function      VMS Status       SCSI Status       <           Log Point Specific Data          >
-------------------------------------------------------------------------------------------------------------------------------
11:44:23.88 COMPLETE_IO       WRITEPBLK         NORMAL                             IRP 890A9A00 PID 8E3D4770 CBUSY 00000000
11:44:23.88 CMD_ENDED                                            GOOD               READ_10           LBA 0446f98f LTH 000001
11:44:23.88 CMD_BEGUN                                            Initialized        READ_10           LBA 0446f98f LTH 000001
11:44:23.88 CMD_ENDED                                            GOOD               WRITE_10          LBA 0446f98f LTH 000001
11:44:23.87 CMD_BEGUN                                            Initialized        WRITE_10          LBA 0446f98f LTH 000001
11:44:23.87 KP_STARTIO        WRITEPBLK                                            IRP 890A9A00 PID 8E3D4770 CBUSY 00000000
11:44:23.87 STARTIO           WRITEPBLK                                            IRP 890A9A00 PID 8E3D4770 CBUSY 00000000
```

```
11:44:23.87 COMPLETE_IO       WRITEPBLK         NORMAL                              IRP 890CA7C0 PID 8E3D4770 CBUSY 00000000
11:44:23.87 CMD_ENDED                                          GOOD                READ_10           LBA 0446e3ec LTH 000001
11:44:23.87 FP_COMPLETE_IO    WRITEPBLK         NORMAL                              IRP 890B0FC0 PID 8E3D4770 CBUSY 00000800
... completed after 1 UCB with 0 no-buffer errors
SDA>
```

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```
Exception Tracing Utility EXC commands:
        EXC LOAD
        EXC UNLOAD
        EXC START TRACE [/BUFFER=pages]
        EXC STOP  TRACE
        EXC SHOW  TRACE

Example:

SDA> exc load
EXC$DEBUG load status = 00000001
SDA> exc start trace
Tracing started...
SDA> wait 0:0:2
SDA> exc stop trace
Tracing stopped...
SDA> exc show trace

Exception Trace Information:
----------------------------
Timestamp               CPU Buffer
----------------------- --- ------------------------------------------------------------------------------------------------------------
11-MAY 11:51:15.365531  00 [$DEALLOC: pcb: 885C8EC0 Added (000007FD.BFFE4020) to freelist. listhead: 000007FD.BFFE0000 status: 0]
11-MAY 11:51:15.365518  00 [CHF_LOOPUNWIND: GET_PREV: [0x00000001] PC: FFFFFFFF.8087F2C0, PSP: 00000000.7AF07400]
11-MAY 11:51:15.365486  00 [CHF_LOOPUNWIND: GET_PREV: [0x00000001] PC: FFFFFFFF.80824260, PSP: 00000000.7AF073B0]
11-MAY 11:51:15.365455  00 [CHF_LOOPUNWIND: Handler returned: 00000918]
11-MAY 11:51:15.365446  00 [LOOPUNWIND: In CHF_LOOPUNWIND]
11-MAY 11:51:15.365445  00 [CHF_STARTUNWIND: GET_PREV: [0x00000001] PC: FFFFFFFF.80868E60, PSP: 00000000.7AF07290]
11-MAY 11:51:15.365415  00 [CHF_STARTUNWIND: GET_CURR: [0x00000001] PC: FFFFFFFF.803B3210, PSP: 00000000.7AF07060]
11-MAY 11:51:15.365332  00 [CHF_STARTUNWIND: INIT_CALL_TRACE_AREA: [0x00000001]]
11-MAY 11:51:15.365330  00 [SYS$SRCHANDLER: returned from handler (r8: 00000001)]
11-MAY 11:51:15.365329  00 [SYS$UNWIND: Returning 00000001]
11-MAY 11:51:15.365328  00 [$DEALLOC: pcb: 885C8EC0 Added (000007FD.BFFE0020) to freelist. listhead: 000007FD.BFFE0000 status: 1]
11-MAY 11:51:15.365324  00 [SYS$UNWIND: Setting unwind target in exception context]
11-MAY 11:51:15.365322  00 [SYS$UNWIND: Found target (2 frame(s) back) frame PC: FFFFFFFF.8087F2C0]
11-MAY 11:51:15.365284  00 [SYS$UNWIND: PC of depth 1 frame: FFFFFFFF.80824260]
11-MAY 11:51:15.365252  00 [SYS$UNWIND: PC of depth 2 frame: FFFFFFFF.80868E60]
11-MAY 11:51:15.365188  00 [SYS$UNWIND: Dispatcher frame found, finding target frame:
11-MAY 11:51:15.365187  00 [SYS$UNWIND:   Frames to unwind: 2, Frame count addr arg: 00000000.7AF06AF0]

    Press RETURN for more.
SDA>

Exception Trace Information:
----------------------------
Timestamp               CPU Buffer
----------------------- --- ------------------------------------------------------------------------------------------------------------
11-MAY 11:51:15.365185  00 [CHECK_DISPATCHER pcb 885C8EC0 called get_unwind with: FFFFFFFF.803BE960]
11-MAY 11:51:15.365152  00 [SYS$UNWIND: got previous frame PC: FFFFFFFF.8000BCE0  OSSD: 00000000.00000000]
11-MAY 11:51:15.365150  00 [CHECK_DISPATCHER pcb 885C8EC0 called get_unwind with: FFFFFFFF.8000BCE0]
11-MAY 11:51:15.365114  00 [SYS$UNWIND: got previous frame PC: FFFFFFFF.80880770  OSSD: 00000000.00000000]
11-MAY 11:51:15.365112  00 [CHECK_DISPATCHER pcb 885C8EC0 called get_unwind with: FFFFFFFF.80880770]
11-MAY 11:51:15.364988  00 [SYS$UNWIND: Getting current frame (SYS$UNWIND)
11-MAY 11:51:15.364987  00 [SYS$UNWIND: ALLOC_CALL_TRACE_AREA: [1], addr: 000007FD.BFFE0040
11-MAY 11:51:15.364985  00 [$ALLOC: pcb: 885C8EC0: returning. trace area: 000007FD.BFFE0040]
11-MAY 11:51:15.364983  00 [SYS$UNWIND: frame count addr: 00000000.7AF06AF0, new return val addr: 00000000.00000000]
11-MAY 11:51:15.364981  00 [SYS$UNWIND: Entered SYS$UNWIND]
11-MAY 11:51:15.364980  00 [SYS$SRCHANDLER: Calling handler: SA: 00000000.7AF06D34, MA: 00000000.7AF06AE0, FV: FFFFFFFF.8E050280]
11-MAY 11:51:15.364977  00 [...HANDLER pcb 885C8EC0 handler fv 8E050280, data 8E264210, dep 2, reinvokable 0]
11-MAY 11:51:15.364966  00 [....SEARCH pcb 885C8EC0 called get_prev_invo_context IP FFFFFFFF.8087F2C0, psp 00000000.7AF07400]
11-MAY 11:51:15.364929  00 [....SEARCH pcb 885C8EC0 called get_prev_invo_context IP FFFFFFFF.80824260, psp 00000000.7AF073B0]
11-MAY 11:51:15.364901  00 [....SEARCH pcb 885C8EC0 called get_prev_invo_context IP FFFFFFFF.80868E60, psp 00000000.7AF07290]
11-MAY 11:51:15.364872  00 [CHF$SEARCH pcb 885C8EC0 mode 0 sig 00000424 pc 80868E60 ps 00000000 dep 1]
11-MAY 11:51:15.364868  00 [....SEARCH pcb 885C8EC0 gpic: IP FFFFFFFF.803B22C0, psp 00000000.7AF07060, cfm: 00000000.00000B1E
...
SDA> exc unload
EXC$DEBUG unload status = 00000001
```

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```
FibreChannel SDA Extension output is best viewed in at least 132 columns

Supported commands (V8.2):

    FC ADDRESS_LIST
    FC KPB
    FC NAME_LIST
    FC PERFORMANCE [/CSV] [/COMPRESS] [/RSCC | /SYSTIME] [/CLEAR] [device-name]
    FC PROBE_LIST
    FC QUEUES [/LIST]
    FC SCDT
    FC SET DEVICE [device-name]
    FC SET ERL /SIZE=entry-count [/ALL]
    FC SET FILTER [/ASC[=list]] [/COMMAND[=list]] [/ESTATUS[=list]]
       [/FCPSTATUS[=list]] [/WWID[=list-quoted-strings]]
       [/MATCH={AND | OR | NOR}] [/APPEND] [/ALL]
    FC SET RING_BUFFER /SIZE=entry-count
```

```
       [/FCP|/SLOW|/ERROR|/INTERRUPTS|/MBX|/IOCB] [/ALL]
    FC SET WTID /WWID=quoted-string [/CAP=cap-value] [/[NO]WAIT]
       [/QFLOAD] [/QFTIMED[=time-value]]
    FC SHOW COUNTERS
    FC SHOW DEVICE [device-name]
    FC SHOW ERL [/ENTRY[=entry-number]] [/REGISTER] [/SIZE] [/ALL]
    FC SHOW FILTER [/ALL]
    FC SHOW PORT
    FC SHOW RING_BUFFER [/FCP|/SLOW|/ERROR|/INTERRUPTS|/MBX|/IOCB]
       [/ASCENDING|/DESCENDING] [/FULL|/BRIEF] [/SIZE[/ALL]]
    FC SHOW STDT [/ALL]
    FC SHOW WTID [/WWID=quoted-string]
    FC TRIAGE [/ALL]


Example:

SDA> fc address_list
FGA0: Address List
 Index Address    State    Probe State NLE  PLE    IND      SEQ#   XID  OELS FLAGS
 ----- -------- ---------- ----------- ---- ---- -------- -------- ---- ---- -----
   0:  00000000                        0    0 00000000        0 0000    0 0000
   1:  00FFFFFE   VALID                 1    0 00000000        0 0000    0 0301
   2:  00FFFFFC   VALID                 2    0 00000000        0 0000    0 0301
   3:  00051000   VALID     REG LOGIN    7    0 00000000        0 0000    0 0200
   4:  00051100   VALID     REG LOGIN    6    0 00000000        0 0000    0 0200
   5:  00051200   VALID     REG LOGIN   11    0 00000000       17 0000    0 0300
   6:  00051600   VALID     REG LOGIN    3    0 00000000        6 0000    0 0300
   7:  00031000   VALID     REG LOGIN    4    0 00000000        0 0000    0 0200
switch-id^^^^switch-port
   8:  00031100   VALID     REG LOGIN    5    0 00000000        0 0000    0 0200
   9:  00031200   VALID     REG LOGIN   10    0 00000000       11 0000    0 0300
  10:  00031500   VALID     REG LOGIN    8    0 00000000       11 0000    0 0300
  11:  00071000   VALID     REG LOGIN    9    0 00000000       11 0000    0 0300
  12:  00FFFFFD   KNOWN                  0    0 00000000        4 0000    0 0001
  13:  00FFFC05   KNOWN                  0    0 00000000        3 0000    0 0001

SDA> fc NAME_LIST
FGA0: Name List
 Index    qfl      qbl      port name        node name      state  ale_index  rpi
 ----- -------- -------- ---------------- ---------------- ------- --------- ----
   0:  00000000 00000000 0000000000000000 0000000000000000 *******     0     0000
   1:  815C6060 815C6060 2003006069203789 1000006069203789  VALID      1     0001
   2:  815C60A8 815C60A8 20FC006069203789 1000006069203789  VALID      2     0003
   3:  815C60F0 815C60F0 10000000C9299C46 20000000C9299C46  VALID      6     0007
   4:  815C6138 815C6138 50001FE100117724 50001FE100117720  VALID      7     0008
   5:  815C6180 815C6180 50001FE100117722 50001FE100117720  VALID      8     0009
   6:  815C61C8 815C61C8 50001FE100106802 50001FE100106800  VALID      4     0005
   7:  815C6210 815C6210 50001FE100106804 50001FE100106800  VALID      3     0004
   8:  815C6258 815C6258 10000000C930BF4B 20000000C930BF4B  VALID     10     000B
   9:  815C62A0 815C62A0 10000000C923A444 20000000C923A444  VALID     11     000C
  10:  815C62E8 815C62E8 10000000C925D530 20000000C925D530  VALID      9     000A
  11:  815C6330 815C6330 10000000C925D8BF 20000000C925D8BF  VALID      5     0006

SDA> fc PROBE_LIST
FGA0: Probe List
 ple count = 15, ple head = 11, ple tail = 11, addresses to probe = 0
   0:   ale index:   0 probe time: 17-NOV-1858 00:00:00.00
   1:   ale index:   3 probe time: 22-APR-2006 16:06:04.82
   2:   ale index:   4 probe time: 22-APR-2006 16:06:04.82
   3:   ale index:   5 probe time: 22-APR-2006 16:06:04.82
   4:   ale index:   6 probe time: 22-APR-2006 16:06:04.82
   5:   ale index:   7 probe time: 22-APR-2006 16:06:04.82
   6:   ale index:   8 probe time: 22-APR-2006 16:06:04.82
   7:   ale index:   9 probe time: 22-APR-2006 16:06:04.92
   8:   ale index:  10 probe time: 22-APR-2006 16:06:04.92
   9:   ale index:  11 probe time: 22-APR-2006 16:06:04.92
  10:   ale index:   5 probe time: 22-APR-2006 16:06:16.17
  11:   ale index:   5 probe time: 22-APR-2006 16:06:30.65
  12:   ale index:   0 probe time: 17-NOV-1858 00:00:00.00
  13:   ale index:   0 probe time: 17-NOV-1858 00:00:00.00
  14:   ale index:   0 probe time: 17-NOV-1858 00:00:00.00

SDA> fc performance/compress $1$dga7:

FibreChannel Disk Performance Data
----------------------------------

$1$dga7 (write)
Using EXE$GQ_SYSTIME to calculate the I/O time
    accumulated write time = 1214033566us
    writes = 1331342
    total blocks = 29017133

I/O rate is about 12 mb/sec

LBC     <2us     <1ms     <2ms     <4ms     <8ms    <16ms    <32ms    <64ms   <128ms   <256ms
=== ======== ======== ======== ======== ======== ======== ======== ======== ======== ========
  1    48154    25536      338      185      225      135       22       12       25        -    74632
  2    19435    11350      190      145      154       62       19       23       16        -    31394
  4    32797    23650      455      406      347      265       62       63       58        1    58104
  8    53401    41651      763      578      817     1928      169      104       64        -    99475
 16    94811    99695     1486      996     1162     2289      240      162      122        1   200964
 32   235684   585731    11049     6274     5725     5929     1045     1007      847        -   853291
 64      836     4905      190       37       29       17        1        3        1        -     6019
128        1     4880     2364      102       76       27        2        4        4        -     7460
256        -        -        -        3        -        -        -        -        -        -        3

      485119   797398    16835     8726     8535    10652     1560     1378     1137        2  1331342


$1$dga7 (read)
```

```
Using EXE$GQ_SYSTIME to calculate the I/O time
    accumulated read time = 15995493us
    reads = 67492
    total blocks = 72604

I/O rate is about 2 mb/sec

LBC     <2us     <1ms     <2ms     <4ms     <8ms    <16ms   <128ms
=== ======== ======== ======== ======== ======== ======== ========
  1    51519    15600      115       30        9       24        1    67298
  2        2        -        -        -        -        -        -        2
  4        7        2        -        -        -        -        -        9
  8       10        2        -        -        -        -        -       12
 16        5        3        -        -        -        -        -        8
 32       81       80        -        -        -        2        -      163

       51624    15687      115       30        9       26        1    67492


SDA> fc scdt
PGA0: SCDTs that have active I/O
  SCDT    DGA  TOTAL_IO   PORT_IO    DEV_IO     FP_IO
--------------------------------------------------------

SDA> fc show device
FGA0: operational firmware revision DS3.91A1
port_name(adapter_id) = 1000-0000-C923-ACB4, node_name(host_id) = 2000-0000-C923-ACB4
SDA> fc show device fgb0
FGB0: operational firmware revision DS3.91A1
port_name(adapter_id) = 1000-0000-C923-A34B, node_name(host_id) = 2000-0000-C923-A34B

SDA> fc show stdt

PGB0 SPDT 817974C0 STDTs
------------------------
                                    | STDT  PRLI  Port  Dev   Cred  Appr | Act  Cmd  Cnf  Rst  PRLO  Cls | QF    Tgt   Ill   Seq
 STDT      FC-LA  Port Name          | Stat  Stat  I/Os  I/Os  I/Os  I/Os | Sus  Sus  Pnd  Act  Pnd   Pau | Seen  Rsts  Frms  Tmo
 --------  -----  ------------------ + ----  ----  ----  ----  ----  ---- + ---  ---  ---  ---  ---   --- + ----  ----  ----  ----
 815D3C00  00004  5000.1FE1.0011.7723 | 0001  0001  0000  0000  0000  0000 | 000  000  000  000  000   000 | 0000  0000  0000  0000
 815CE880  00005  5000.1FE1.0011.7721 | 0001  0001  0000  0000  0000  0000 | 000  000  000  000  000   000 | 0000  0000  0000  0000
 817E15C0  00006  5000.1FE1.0010.6801 | 0001  0001  0000  0000  0000  0000 | 000  000  000  000  000   000 | 0000  0000  0000  0000
 817F5E40  00007  5000.1FE1.0010.6803 | 0001  0001  0000  0000  0000  0000 | 000  000  000  000  000   000 | 0000  0000  0000  0000

SDA> fc show ring

FGB0: Ring Buffer Trace Information from RBD 815EE110
-----------------------------------------------------
 Date   Time         Event ID      Data      Buff [7] Buff [6] Buff [5] Buff [4] Buff [3] Buff [2] Buff [1] Buff [0]  RBE
 ----   ----         --------      ----      -------- -------- -------- -------- -------- -------- -------- --------  --------
 10-MAY 10:03:00.67  Read IOCB     00010083  18A29906 038300FD 00000000 00000200 921BC89C 00000000 81CE15B0 40000024  81615B40
 10-MAY 10:03:00.67  Read IOCB     00010082  18A29906 06090032 00000000 00000200 921BC89C 00000000 81FF2EB0 40000024  81615B10
 10-MAY 10:03:00.67  Read IOCB     00010081  18A29906 04F00032 00000000 00002000 921BC853 00000000 81FF2EB0 40000024  81615AE0
 10-MAY 10:03:00.66  Read IOCB     00010080  18A29906 052600FD 00000000 00002000 921BC853 00000000 81CE15B0 40000024  81615AB0
 10-MAY 10:03:00.65  Read IOCB     0001007F  18A29906 009500FD 00000000 00000200 921BC6D0 00000000 81CE15B0 40000024  81615A80
 10-MAY 10:03:00.65  Read IOCB     0001007E  18A29906 05B80032 00000000 00000200 921BC6D0 00000000 81FF2EB0 40000024  81615A50
 10-MAY 10:03:00.64  Read IOCB     0001007D  18A29906 01800032 00000000 00003000 921BC630 00000000 81FF2EB0 40000024  81615A20
 10-MAY 10:03:00.64  Read IOCB     0001007C  18A29906 036700FD 00000000 00003000 921BC630 00000000 81CE15B0 40000024  816159F0
 10-MAY 10:03:00.64  Read IOCB     0001007B  18A29906 070700FD 00000000 00001000 921BC630 00000000 81CE15B0 40000024  816159C0
 10-MAY 10:03:00.64  Read IOCB     0001007A  18A29906 05350032 00000000 00001000 921BC630 00000000 81FF2EB0 40000024  81615990
 10-MAY 10:03:00.64  Read IOCB     00010079  18A29906 05240032 00000000 00003000 921BC619 00000000 81FF2EB0 40000024  81615960
 10-MAY 10:03:00.64  Read IOCB     00010078  18A29906 046900FD 00000000 00003000 921BC619 00000000 81CE15B0 40000024  81615930
 10-MAY 10:03:00.64  Read IOCB     00010077  18A29906 024700FD 00000000 00001000 921BC619 00000000 81CE15B0 40000024  81615900
 10-MAY 10:03:00.64  Read IOCB     00010076  18A29906 000E0032 00000000 00001000 921BC619 00000000 81FF2EB0 40000024  816158D0
 10-MAY 10:03:00.64  Read IOCB     00010075  18A29906 003800DB 00000000 00002000 921BC614 00000000 81F82EB0 40000024  816158A0
 10-MAY 10:03:00.64  Read IOCB     00010074  18A29906 034C0032 00000000 00002000 921BC614 00000000 81FF2EB0 40000024  81615870
 10-MAY 10:03:00.64  Read IOCB     00010073  18A29906 016300FD 00000000 00006000 921BC611 00000000 81CE15B0 40000024  81615840

    Press RETURN for more.

SDA> fc show wtid

WTIDs (WWID Throttle IO Descriptors)
------------------------------------
                                                                    | Conn  Port  Dev   Cred  Appr | QF    Cred  User   Current
 WTID      Product ID        Node WWID            Port WWID          | Cnt   I/Os  I/Os  I/Os  I/Os | Seen  Avl   Cap    QF Alg
 --------  ----------------  -------------------  ------------------ + ----  ----  ----  ----  ---- + ----  ----  ----   -------
 817E2750  HSG80CCL          5000.1FE1.0010.6800  5000.1FE1.0010.6801 | 0001  0000  0000  0000  0000 | 0000  8000  0000   T/5000
 815C7A90  HSG80CCL          5000.1FE1.0010.6800  5000.1FE1.0010.6802 | 0001  0000  0000  0000  0000 | 0000  8000  0000   T/5000
 817F3150  HSG80CCL          5000.1FE1.0010.6800  5000.1FE1.0010.6803 | 0001  0000  0000  0000  0000 | 0000  8000  0000   T/5000
 815D0710  HSG80CCL          5000.1FE1.0010.6800  5000.1FE1.0010.6804 | 0001  0000  0000  0000  0000 | 0000  8000  0000   T/5000
 817C06D0  HSG80CCL          5000.1FE1.0011.7720  5000.1FE1.0011.7721 | 0001  0000  0000  0000  0000 | 0000  8000  0000   T/5000
 815D3090  HSG80CCL          5000.1FE1.0011.7720  5000.1FE1.0011.7722 | 0001  0000  0000  0000  0000 | 0000  8000  0000   T/5000
 8179E510  HSG80CCL          5000.1FE1.0011.7720  5000.1FE1.0011.7723 | 0001  0000  0001  0000  0000 | 0000  7FFF  0000   T/5000
 815CD690  HSG80CCL          5000.1FE1.0011.7720  5000.1FE1.0011.7724 | 0001  0000  0000  0000  0000 | 0000  8000  0000   T/5000
```

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```
Alignment Fault Tracing Utility FLT commands:
        FLT LOAD
        FLT UNLOAD
        FLT START TRACE [/BUFFER=pages]
                        [/BEGIN=pc_range_low] [/END=pc_range_high]
        FLT STOP  TRACE
        FLT SHOW  TRACE [/SUMMARY]

Example:

SDA> flt load
```

```
FLT$DEBUG load status = 00000001
SDA> flt start trace
Tracing started...
SDA> flt stop trace
SDA> flt show trace/summ

Fault Trace Information: (at 19-APR-2006 09:10:45.24, trace time 00:00:01.379162)
------------------------------------------------------------------------------
Exception PC              Count   Exception PC                          Module                          Offset
-----------------   ------------  ------------------------------------  ------------------------------------

00000000.0015A8B0          81920
00000000.00176510          81919
00000000.00167F80          40959

                           ! the default FLT trace buffer contains about 205000 entries.
SDA> flt show trace

Unaligned Data Fault Trace Information:
---------------------------------------
Timestamp               CPU  Unaligned VA       Exception PC                          Access      EPID    Trace Buffer
----------------------- ---  -----------------  ------------------------------------  --------  --------  -----------------
19-APR 09:10:42.800631  00   00000000.04C5C806  0015A8B0                              User      3B000D70  FFFFFFFF.7CC09958
19-APR 09:10:42.800625  00   00000000.04C5C6FA  00176510                              User      3B000D70  FFFFFFFF.7CC09930
19-APR 09:10:42.800619  00   00000000.04C5C6EF  0015A8B0                              User      3B000D70  FFFFFFFF.7CC09908
19-APR 09:10:42.800615  00   00000000.04C5C6E6  00176510                              User      3B000D70  FFFFFFFF.7CC098E0
19-APR 09:10:42.800608  00   00000000.04C5C5FD  00167F80                              User      3B000D70  FFFFFFFF.7CC098B8
19-APR 09:10:42.800598  00   00000000.04C5C806  0015A8B0                              User      3B000D70  FFFFFFFF.7CC09890
19-APR 09:10:42.800592  00   00000000.04C5C6FA  00176510                              User      3B000D70  FFFFFFFF.7CC09868
19-APR 09:10:42.800586  00   00000000.04C5C6EF  0015A8B0                              User      3B000D70  FFFFFFFF.7CC09840
19-APR 09:10:42.800582  00   00000000.04C5C6E6  00176510                              User      3B000D70  FFFFFFFF.7CC09818
19-APR 09:10:42.800575  00   00000000.04C5C5FD  00167F80                              User      3B000D70  FFFFFFFF.7CC097F0
19-APR 09:10:42.800565  00   00000000.04C5C806  0015A8B0                              User      3B000D70  FFFFFFFF.7CC097C8
19-APR 09:10:42.800559  00   00000000.04C5C6FA  00176510                              User      3B000D70  FFFFFFFF.7CC097A0
19-APR 09:10:42.800553  00   00000000.04C5C6EF  0015A8B0                              User      3B000D70  FFFFFFFF.7CC09778
19-APR 09:10:42.800549  00   00000000.04C5C6E6  00176510                              User      3B000D70  FFFFFFFF.7CC09750
19-APR 09:10:42.800542  00   00000000.04C5C5FD  00167F80                              User      3B000D70  FFFFFFFF.7CC09728
19-APR 09:10:42.800533  00   00000000.04C5C806  0015A8B0                              User      3B000D70  FFFFFFFF.7CC09700
19-APR 09:10:42.800526  00   00000000.04C5C6FA  00176510                              User      3B000D70  FFFFFFFF.7CC096D8

    Press RETURN for more.
SDA> set proc/id=3B000D70
SDA> show proc/ima

Process index: 0070   Name: CHARONVAX         Extended PID: 3B000D70
------------------------------------------------------------------

                           Process activated images
                           ------------------------

              Image Name                    Type       IMCB          GP
------------------------------------- ------------ -------- -----------------
CHARON                                MAIN         7FEB4C80 00000000.00A70000
...
SDA> exa/ins 0015A8B0
                { .mib
CHARON+0015A8B0:            ld4         r8 = [r23]
                            nop.i       000000
                            br.many     0000250 ;;
                }
SDA> exa/ins 00176510
                { .mib
CHARON+00176510:            ld4         r8 = [r29]
                            nop.i       000000
                            br.many     1FFF200 ;;
                }
SDA> exa/ins 00167F80
                { .mib
CHARON+00167F80:            ld2         r8 = [r15]
                            nop.i       000000
                            br.many     0000210 ;;

SDA> flt unload
FLT$DEBUG unload status = 00000001
SDA> EXIT
```

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```
%CLI-W-SYNTAX, error parsing 'FORMS'
```

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```
I/O Tracing Utility IO commands:

        IO LOAD                     - load IO$DEBUG execlet
        IO UNLOAD                   - unload IO$DEBUG execlet

        IO START TRACE              - start I/O tracing
                 [/BUFFER=pages]    - size of trace buffer (in 8K page units)
                 [/[NO]BIO]         - trace buffered I/Os, default
                 [/[NO]DIO]         - trace direct I/Os, default
                 [/XQP]             - trace file system info into TR trace buffer
        IO STOP  TRACE              - stop I/O tracing
        IO SHOW  TRACE              - decode and display trace buffer entries
                 [/BIO]             - display buffered I/O entries
                 [/DIO]             - display direct I/O entries

        IO START COLLECT            - start I/O statistic collection
                 [/BIO]             - start collect buffered I/O info
```

```
                [/DIO]              - start collect direct I/O info
                [/DEVICE]           - collect I/O statistics per device
                [/PROCESS]          - collect I/O statistics per process
        IO STOP  COLLECT            - stop I/O statistic collection
        IO SHOW  COLLECT            - show I/O statistic summary information
                [/FULL]             - display also I/O function counters
                [/TOP=n]            - display only the top-N largest counters (default=10)
```

Example:

```
SDA> io load
IO$DEBUG load status = 00000001
SDA> io start collect
No I/O trace buffer available, tracing not yet started...
SDA> io start trace
I/O Tracing started...
SDA> io start collect
Please specify either /DEVICE or /PROCESS
SDA> io start collect/device
SDA> io show collect

Direct/Buffered IO Statistic Information:  (collection running 6 seconds)
------------------------------------------------------------------------
UCB       Device                      Opcnt      Dir IO      Buf IO    Function       Fnc Count
--------  ----------------    ------------  ----------  ----------  ----------  ------------
8855B300  BG62                          13           0          13
88775400  TNA218                        9           0           9
885AE200  BG156                         6           0           6
88577C80  BG29877                       3           0           3
885ABC40  BG153                         3           0           3
885ACC80  BG154                         3           0           3
885BA680  BG183                         3           0           3
88576E00  BG122                         2           0           2
885AA340  ??????                        2           0           2
88648A80  BG14478                       2           0           2

SDA> io show trace

I/O Trace Information:
----------------------
Timestamp               CPU  IRP        SeqNum   UCB       Device        Oper     Function    Trace Buffer       Byte Cnt   Media
----------------------- ---  --------   --------  --------  ------------  -------- ----------  -----------------  --------  --------
11-MAY 11:28:52.217675  00   890B27C0   0B971687  88775400  TNA218        BufIO    unload      FFFFFFFF.7C4A97C8  00000001  00010001
11-MAY 11:28:52.217600  00   890B27C0   0B97164D  88775400  TNA218        BufIO    nop         FFFFFFFF.7C4A9790  0000000E  000D0001
11-MAY 11:28:52.053017  00   890ADD80   0B97158A  88575640  BG120         BufIO    sensemode   FFFFFFFF.7C4A9758  00000000  0000022C
11-MAY 11:28:51.972019  00   88552680   0B971656  8855B300  BG62          BufIO    sensemode   FFFFFFFF.7C4A9720  00000000  0000022C
11-MAY 11:28:51.604671  00   890B37C0   0B971683  885B1080  BG177         BufIO    readlblk    FFFFFFFF.7C4A96E8  00000000  00080001
11-MAY 11:28:51.604638  00   890B37C0   0B971682  885B1080  BG177         BufIO    readlblk    FFFFFFFF.7C4A96B0  00000000  00140001
11-MAY 11:28:51.604594  00   890B37C0   0B971681  885B1BC0  BG179         BufIO    sensemode   FFFFFFFF.7C4A9678  00000000  00010001
11-MAY 11:28:51.604497  00   890B37C0   0B97167C  885B1080  BG177         BufIO    writelblk   FFFFFFFF.7C4A9640  00000000  00140001
11-MAY 11:28:51.604263  00   890A9A00   0B97167F  885B2E00  BG178         BufIO    readlblk    FFFFFFFF.7C4A9608  00000000  002303A4
11-MAY 11:28:51.604236  00   890A9A00   0B97167E  885B2E00  BG178         BufIO    writelblk   FFFFFFFF.7C4A95D0  00000000  001C0001
11-MAY 11:28:51.604182  00   890A9A00   0B97167D  885B2E00  BG178         BufIO    readlblk    FFFFFFFF.7C4A9598  00000000  00140001
11-MAY 11:28:51.604111  00   890A9A00   0B971676  88576E00  BG122         BufIO    sensemode   FFFFFFFF.7C4A9560  00000000  00010001
11-MAY 11:28:51.604014  00   890B37C0   0B971527  885B1BC0  BG179         BufIO    sensemode   FFFFFFFF.7C4A9528  00000000  0000022C
11-MAY 11:28:51.588013  00   890BED80   0B971646  885BA680  BG183         BufIO    sensemode   FFFFFFFF.7C4A94F0  00000000  0000022C
11-MAY 11:28:51.583662  00   890B4FC0   0B971679  885A6F40  BG146         BufIO    readlblk    FFFFFFFF.7C4A94B8  00000000  00080001
11-MAY 11:28:51.583629  00   890B4FC0   0B971678  885A6F40  BG146         BufIO    readlblk    FFFFFFFF.7C4A9480  00000000  00140001
11-MAY 11:28:51.583586  00   890B4FC0   0B971677  885A83C0  BG148         BufIO    sensemode   FFFFFFFF.7C4A9448  00000000  00010001

    Press RETURN for more.

I/O Trace Information:
----------------------
Timestamp               CPU  IRP        SeqNum   UCB       Device        Oper     Function    Trace Buffer       Byte Cnt   Media
----------------------- ---  --------   --------  --------  ------------  -------- ----------  -----------------  --------  --------
11-MAY 11:28:21.702675  00   890AC7C0   0B97154A  88221180  DSA64         BufIO    deaccess    FFFFFFFF.7C4A6000  00000005  00000001
11-MAY 11:28:21.701902  00   88566840   0B97154B  88221180  DSA64         DirIO    writepblk   FFFFFFFF.7C4A5FC8  00000200  02000001
11-MAY 11:28:21.691097  00   890AC7C0   0B971548  88221180  DSA64         BufIO    access      FFFFFFFF.7C4A5F90  00000005  00000910
11-MAY 11:28:21.670744  00   890AC7C0   0B97153B  88221180  DSA64         BufIO    access      FFFFFFFF.7C4A5F58  0000000E  00000001
11-MAY 11:28:21.669487  00   890AC7C0   0B97153A  88221180  DSA64         BufIO    deaccess    FFFFFFFF.7C4A5F20  00000005  00000001
11-MAY 11:28:21.667923  00   890AC7C0   0B971539  88221180  DSA64         BufIO    access      FFFFFFFF.7C4A5EE8  0000000E  00000001
11-MAY 11:28:21.666683  00   890AC7C0   0B971537  88221180  DSA64         BufIO    deaccess    FFFFFFFF.7C4A5EB0  00000005  00000001
11-MAY 11:28:21.665900  00   88566840   0B971538  88221180  DSA64         DirIO    writepblk   FFFFFFFF.7C4A5E78  00000200  02000001
11-MAY 11:28:21.655208  00   890AC7C0   0B971535  88221180  DSA64         BufIO    access      FFFFFFFF.7C4A5E40  00000005  00000910
11-MAY 11:28:21.638094  00   890AC7C0   0B971528  88221180  DSA64         BufIO    access      FFFFFFFF.7C4A5E08  0000000E  00000001
11-MAY 11:28:21.636195  00   890AC7C0   0B97116F  8845A480  TTA0          BufIO    nop         FFFFFFFF.7C4A5DD0  00000000  0000022C
11-MAY 11:28:21.603673  00   890B37C0   0B971526  885B1080  BG177         BufIO    readlblk    FFFFFFFF.7C4A5D98  00000000  00080001
...


SDA> io start trace
I/O Tracing started...
SDA> io start collect/proc
SDA> io show collect

Direct/Buffered IO Statistic Information:  (collection running 7 seconds)
------------------------------------------------------------------------
PCB       EPID      Process Name      Current Main Image              Opcnt      Dir IO      Buf IO    Function       Fnc Count
--------  --------  ----------------  --------------------    ------------  ----------  ----------  ----------  ------------
88613C80  3B00138A  SYSTEM            SDA                             14           0          14
88551700  3B000121  TCPIP$NTP_1       TCPIP$NTP                       11           0          11
885BBD80  3B000130  WBEM$SERVER       WBEM$SERVER                      6           0           6
00000000  3B000100  NULL                                               3           0           3
8847AA00  3B000128  WBEM$CPQHOST      CPQHOST_MIB                      2           0           2
88596A00  3B00012C  WBEM$CPQTHRESH    CPQTHRESH_MIB                    2           0           2
88561E00  3B000123  TCPIP$SNMP_1      TCPIP$ESNMP_SERVER               1           0           1
88689D80  3B0010A1  NMBD              NMBD                             1           0           1
SDA> io stop collect
SDA> io stop trace
I/O Tracing stopped...
SDA> io unload
```

```
IO$DEBUG unload status = 00000001
```

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```
%HELP-E-OPENIN, error opening SYS$COMMON:[SYSHLP]IPC$SDA.HLB; as input
-RMS-E-FNF, file not found
```

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```
LAN

     This command executes the LAN-specific SDA extension image which is
     a collection of LAN-specific commands which mirror some of the display
     functions of SYS$SYSTEM:LANCP.EXE in SDA.

     By default this image is loaded from SYS$SHARE.  However, it can
     be redirected with the following logical:

        $ define lan$sda [dir-spec]lan$sda.exe

     Format:

        SDA> LAN command


  Additional information available:

  HELP       COUNTERS   CONFIG     INTERNAL_COUNTERS     QUEUES     RINGS
  TRACE      VC         FCARP
```

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```
SDA> lck

LCK Utility - Quick Help Information
------------------------------------
LCK commands:

        LCK LOAD                    - load LCK$DEBUG execlet
        LCK UNLOAD                  - unload LCK$DEBUG execlet

        LCK STATISTIC               - display lock manager statistic information
                  [/[NO]ALL]        - display or ignore everything possible
                  [/[NO]LOCKS]      - display or ignore lock information
                  [/[NO]RESOURCES]  - display or ignore resource information
                  [/[NO]TREES]      - display or ignore resource tree information
                  [/[TOPTREES=n]    - only display the top-n largest resource trees

        LCK SHOW  ACTIVE            - displays the resource tree, which currently have lckmgr activity

        LCK SHOW  LCKMGR            - displays information about the dedicated lock manager performance
                  [/INTERVAL=n]     - specifies the interval in seconds for the stats report (default 60)
                  [/REPETITION=n]   - specifies how many stats report should be displayed (default 10)

        LCK START COLLECT           - starts to collect lock manager statistics
                  [/PROCESS]        - starts to collect per-Process locking operations
                  [/STATISTICS]     - collects general lckmgr info once per minute
                  [/[NO]BATCH]      - will display collected lckmgr every hour (for batch job execution)
        LCK STOP  COLLECT           - stops collecting lckmgr info
        LCK SHOW  COLLECT           - displays collected lckmgr info (averaged per minute)

        LCK SHOW  CONTENTION        - monitors lock timeout queue for locks requests stalling
                  [/INTERVAL=n]     - interval check in seconds (fraction of second possible, i.e. /INT=0.2)
        LCK STOP  CONTENTION        - stops any pending lock contention timers

        LCK START TRACE             - start tracing everything
                  [/BUFFER=n]       - size of trace buffer (in Alpha Pages, default 128 = 1MB)
                  [/[NO]ALL]        - trace or ignore everything possible
                  [/[NO]NEWLOCK]    - trace or ignore new lock requests
                  [/[NO]CONVERSION] - trace or ignore conversion requests
                  [/[NO]DEQUEUE]    - trace or ignore dequeue requests
                  [/[NO]EXIT]       - trace or ignore lckmgr exit path
                  [/[NO]ERROR]      - trace or ignore lckmgr error path
                  [/[NO]STALL]      - trace or ignore stall requests
                  [/[NO]INFO]       - trace or ignore lckmgr debug info
                  [/[NO]GRANTED]    - trace or ignore lckmgr granted path
        LCK STOP  TRACE             - stop tracing
        LCK SHOW  TRACE             - decode and display trace buffer entries
                  [/[NO]ALL]        - display or ignore everything possible
                  [/[NO]NEWLOCK]    - display or ignore new lock requests
                  [/[NO]CONVERSION] - display or ignore conversion requests
                  [/[NO]DEQUEUE]    - display or ignore dequeue requests
                  [/[NO]EXIT]       - display or ignore lckmgr exit path
                  [/[NO]ERROR]      - display or ignore lckmgr error path
                  [/[NO]STALL]      - display or ignore stall requests
                  [/[NO]INFO]       - display or ignore lckmgr debug info
                  [/[NO]GRANTED]    - display or ignore lckmgr granted path

        LCK REBUILD                 - triggers a rebuild operation
                  [/PARTIAL]        - triggers a partial rebuild
                  [/FULL]           - triggers a full rebuild
                  [/DIRECTORY]      - triggers a directory rebuild
```

```
        LCK REMASTER                - triggers lock remaster operation
                  [/ALL]            - attempts to remaster all trees possible
                  [/ADDRESS=n]      - will only remaster a specific tree
                  [/CSID=n][/NODE=n] - specifies the target system to remaster the tree to
                  [/[NO]LIST]       - display information on resources remastered
                  [/CHECK]          - will not actually attempt to remaster only checks
                  [/COST]

        LCK START REGRESSION        - starts lock remaster regression tests
                  [/OPERATION=(n,m)] - specifies what test: Load, Rebuild, Remaster (default Load only)
                  [/THREADS=n]      - will create n-number of threaded detached processes (default 4)
                  [/TREES=n]        - specifies how many trees each thread creates (default 10)
                  [/LOCKS=n]        - specifies how many locks each tree will have (default 100)
                  [/INTERVAL=n]     - specifies the interval in seconds for rebuild/remaster tests (default 60)
                  [/[NO]WAIT]       - operations on trees mastered locally (wait=prohibit, nowait=allow)
        LCK STOP  REGRESSION        - stops lock remaster regression tests
        LCK SHOW  REGRESSION        - displays information about lock remaster regression tests
                  [/TICKS]          - displays ticks per second statistics from load regression
                  [/INTERVAL=n]     - specifies the interval in seconds for the stats report (default 60)
                  [/REPETITION=n]   - specifies how many stats report should be displayed (default 10)

        LCK START PERFORMANCE       - starts lock manager performance tests
                  [/THREADS=n]      - will create up to n-number of threaded detached processes (default active CPU count)
                  [/TEST=n]         - specifies with which test to start (default is all tests)
                  [/BATCH]          - will hibernate to allow run as batch job
```

Example:

```
SDA> lck show active

Active Resource Tree Information (Node I64VMS)
----------------------------------------------
RSB Address         Tot Locks   SubRSB     Act   Node     Resource Name
-----------------   ---------   ------   -----   ------   -------------------------------
FFFFFFFF.7D773AC0        3880     2212      16   I64VMS   F11B$vI64V82SYS
FFFFFFFF.7D7E3840          34        9      14   I64VMS   RMS$.......I64V82SYS   ...
                                                          File: DISK$I64V82SYS:[VMS$COMMON.SYSEXE]RIGHTSLIST.DAT;1
FFFFFFFF.7D776BC0           2        2       5   I64VMS   RMS$·.....I64V82SYS   ...
                                                          File: DISK$I64V82SYS:[VMS$COMMON.T4$DATA]T4_I64VMS_10MAY2006_1030_2359_MON

SDA> lck start collect
Please specify either /PROCESS or /STATISTICS
SDA> lck start collect/proc
LCK$DEBUG not loaded...
SDA> lck load
LCK$DEBUG load status = 00000001
SDA> lck start collect/proc
No trace buffer available, tracing not yet started...
SDA> lck start trace
Tracing started...
SDA> lck start collect/proc
SDA> lck stop collect
SDA> lck stop trace
Tracing stopped...
SDA> lck sho collect

Per-Process Lock Statistic Information:  (collection running 18 seconds)
------------------------------------------------------------------------
IPID      EPID      Process Name      Current Image               Lock Ops      Enqueues      Converts      Dequeues
--------  --------  ----------------  --------------------    ------------  ------------  ------------  ------------
00130071  3B001371  T43B001369_MON    MONITOR_IA64                      77            19            39            19
00000000  3B000100  NULL                                                17             1            15             1
00130072  3B001372  T43B001369_XFC    T4$XFC_MON                        10             2             6             2
00130073  3B001373  T43B001369_Lck7   T4$LCK73_MON                      10             2             6             2
0013007A  3B00137A  T43B001369_EWA0   T4$NET_MON                        10             2             6             2
00130074  3B001374  T43B001369_TCP    TCPIP$TCP_MON                     6             1             4             1
0001001A  3B00011A  TP_SERVER         TPSERV                            5             2             1             2
SDA>


SDA> lck stat

Lock Manager Statistics (Node I64VMS)
-------------------------------------
Total Locks . . . . . . . . . . . . . :        8101
      Local Copy Locks  . . . . . . . :        7440
      Process Copy Locks  . . . . . . :           0
      Master Copy Locks . . . . . . . :         532
      Cached Locks  . . . . . . . . . :         129

Total Resources . . . . . . . . . . . :        7955
      Locally Mastered  . . . . . . . :        5976
Total Root Resources  . . . . . . . . :        4620
      Locally Mastered  . . . . . . . :        2641
Total Cached Resources  . . . . . . . :         163

Size of Resource Hash Table . . . . . :      131072
Used Entries  . . . . . . . . . . . . :        7660
Usage . . . . . . . . . . . . . . . . :           5.8%
Average Chain Length  . . . . . . . . :           1.04
Maximum Chain Length  . . . . . . . . :           3
Top Chain Length  . . . . . . . . . . :           3  3  3  3  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2
Chain Distribution  . . . . . . . . . :           1      2      3      4      5      6      7      8      9     10+
                                               7369    287      4      0      0      0      0      0      0      0

Resource Tree Information (Node I64VMS)
---------------------------------------
RSB Address         Tot Locks   SubRSB     Act   Node     Resource Name
-----------------   ---------   ------   -----   ------   -------------------------------
FFFFFFFF.7D773AC0        3872     2212      14   I64VMS   F11B$vI64V82SYS
FFFFFFFF.7D7CBD40         565      564       0   I64VMS   F11B$vI64SYSBCK
FFFFFFFF.7D72FE80         422      416       0   I64VMS   F11B$vUSER1
```

```
FFFFFFFF.7D7E3840          45        9       3   I64VMS   RMS$.......I64V82SYS    ...
                                                          File: DISK$I64V82SYS:[VMS$COMMON.SYSEXE]RIGHTSLIST.DAT;1
FFFFFFFF.7D87D5C0          22        4       0   I64VMS   RMS$2......I64V82SYS    ...
                                                          File: DISK$I64V82SYS:[VMS$COMMON.APACHE.SPECIFIC.I64VMS.LOGS]ACCESS_LOG.;1
...
SDA>
```

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```
SDA> les help show

SHOW


      Prints information about data structures concerned with the
      operation of LES

        SHOW ... options ... [ /FULL ] [ /ALL ]

      *NOTE*

      If a logical LES$SYM is defined (as a directory spec), then
      SDA will attempt to read the following symbol table files in
      from LES$SYM: on the first execution any show les command :

        LES$LES_V30.EXE (relative to the start of the LES image)
        LES_SYMBOLS.STB
        LES$ACP_CODE.STB

  Additional information available:

  PPI        SYSTEM     CDB        LPD        STRING     ITEMLIST
  TRACEBUFFER
```

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```
Logical Name Tracing Utility LNM commands:

        LNM LOAD
        LNM UNLOAD

        LNM START TRACE [/BUFFER=pages]
        LNM STOP  TRACE
        LNM SHOW  TRACE [/IDENTIFICATION=epid]
                        [/LOGICAL=logical[*]]

        LNM START COLLECT [/LOGICAL] [/PROCESS]
        LNM STOP  COLLECT
        LNM SHOW  COLLECT


Example:

SDA> lnm load
LNM$DEBUG load status = 00000001
SDA> lnm start trace
Tracing started...
SDA> lnm stop trace
Tracing stopped...
SDA> lnm show trace

Logical Name Trace Information:
--------------------------------
Timestamp                CPU    EPID    Main Image               CallerPC                         Logical Name
----------------------   ---  --------  -----------------------  -------------------------------  --------------------------------
10-MAY 10:29:26.185834    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         UCX$SNMP_INACT_TERM
10-MAY 10:29:26.185821    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         TCPIP$SNMP_INACT_TERM
10-MAY 10:29:26.185808    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         UCX$SNMP_MASTER_TIMEOUT
10-MAY 10:29:26.185794    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         TCPIP$SNMP_MASTER_TIMEOUT
10-MAY 10:29:26.185718    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         UCX$SNMP_MAX_MSG_LEN
10-MAY 10:29:26.185705    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         TCPIP$SNMP_MAX_MSG_LEN
10-MAY 10:29:26.185678    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         UCX$SNMP_MAX_GETSET_LEN
10-MAY 10:29:26.185665    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         TCPIP$SNMP_MAX_GETSET_LEN
10-MAY 10:29:26.185652    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         UCX$SNMP_MAX_GETSET_LEN
10-MAY 10:29:26.185638    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         TCPIP$SNMP_MAX_GETSET_LEN
10-MAY 10:29:26.185584    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         UCX$SNMP_SIGNAL
10-MAY 10:29:26.185570    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         TCPIP$SNMP_SIGNAL
10-MAY 10:29:26.184870    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         UCX$SNMP_INACT_TERM
10-MAY 10:29:26.184857    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         TCPIP$SNMP_INACT_TERM
10-MAY 10:29:26.184813    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         UCX$SNMP_MASTER_TIMEOUT
10-MAY 10:29:26.184799    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         TCPIP$SNMP_MASTER_TIMEOUT
10-MAY 10:29:26.184725    00  3B000123  TCPIP$ESNMP_SERVER       00000000                         UCX$SNMP_MAX_MSG_LEN

    Press RETURN for more.
SDA>
SDA> lnm start collect/process
SDA> lnm show collect

Logical Name Trace Information:
--------------------------------
       Count      EPID
------------    --------
         144    3B000123
          87    3B000132
           8    3B00012F
```

```
           5    3B00012B
           4    3B000128
           4    3B000129
           4    3B00012A
           1    3B001368

SDA> lnm stop collect
SDA> lnm stop trace
Tracing stopped...
SDA> lnm unload
LNM$DEBUG unload status = 00000001
SDA>
```

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```
Mutex Tracing Utility MTX commands:
        MTX LOAD
        MTX UNLOAD
        MTX START TRACE [/BUFFER=pages] [/CPU=n] [/MUTEX=mutex]
        MTX STOP  TRACE
        MTX SHOW  TRACE [/MUTEX=(mutex[,...])] [/SUMMARY]
                        [/CPU=n] [/TOP=n]

Example:

SDA> mtx load
MTX$DEBUG load status = 00000001
SDA> mtx start trace
Tracing started... (Mutex = 00000000)
SDA> mtx stop trace
Tracing stopped...
SDA> mtx show trace

Mutex Trace Information:
------------------------
Timestamp               CPU Mutex             Callers PC                              EPID     Operation             Trace Buffer
----------------------- --- ----------------- --------------------------------------- -------- --------------------- -----------------
10-MAY 11:26:54.672742  00 8E01E000 IODB     817AC330 TCPIP$TNDRIVER+23D30           FFFFFFFF Unlock Exec Quad      FFFFFFFF.7C278C40
10-MAY 11:26:54.672741  00 8E01E000 IODB     817AC1E0 TCPIP$TNDRIVER+23BE0           FFFFFFFF Lock Read Exec Quad   FFFFFFFF.7C278C20
10-MAY 11:26:53.671743  00 8E01E000 IODB     817AC330 TCPIP$TNDRIVER+23D30           FFFFFFFF Unlock Exec Quad      FFFFFFFF.7C278C00
10-MAY 11:26:53.671742  00 8E01E000 IODB     817AC1E0 TCPIP$TNDRIVER+23BE0           FFFFFFFF Lock Read Exec Quad   FFFFFFFF.7C278BE0
10-MAY 11:26:52.722883  00 8E01E000 IODB     80495A50 EXE$DVI_FREEBLOCKS_C+00750     3B000125 Unlock Quad           FFFFFFFF.7C278BC0
10-MAY 11:26:52.722882  00 8E01E000 IODB     80496D10 IO_ROUTINES_MON+74310          3B000125 Lock Read Quad        FFFFFFFF.7C278BA0
10-MAY 11:26:52.722874  00 8E01E000 IODB     804891D0 IO_ROUTINES_MON+667D0          3B000125 Unlock Quad           FFFFFFFF.7C278B80
10-MAY 11:26:52.722861  00 8E01E000 IODB     80494630 IO_ROUTINES_MON+71C30          3B000125 Lock Read Quad        FFFFFFFF.7C278B60
10-MAY 11:26:52.722857  00 8E01E000 IODB     80495A50 EXE$DVI_FREEBLOCKS_C+00750     3B000125 Unlock Quad           FFFFFFFF.7C278B40
10-MAY 11:26:52.722855  00 8E01E000 IODB     80496D10 IO_ROUTINES_MON+74310          3B000125 Lock Read Quad        FFFFFFFF.7C278B20
10-MAY 11:26:52.722847  00 8E01E000 IODB     804891D0 IO_ROUTINES_MON+667D0          3B000125 Unlock Quad           FFFFFFFF.7C278B00
10-MAY 11:26:52.722834  00 8E01E000 IODB     80494630 IO_ROUTINES_MON+71C30          3B000125 Lock Read Quad        FFFFFFFF.7C278AE0
10-MAY 11:26:52.722831  00 8E01E000 IODB     80495A50 EXE$DVI_FREEBLOCKS_C+00750     3B000125 Unlock Quad           FFFFFFFF.7C278AC0
10-MAY 11:26:52.722828  00 8E01E000 IODB     80496D10 IO_ROUTINES_MON+74310          3B000125 Lock Read Quad        FFFFFFFF.7C278AA0
10-MAY 11:26:52.722821  00 8E01E000 IODB     804891D0 IO_ROUTINES_MON+667D0          3B000125 Unlock Quad           FFFFFFFF.7C278A80
10-MAY 11:26:52.722809  00 8E01E000 IODB     80494630 IO_ROUTINES_MON+71C30          3B000125 Lock Read Quad        FFFFFFFF.7C278A60
10-MAY 11:26:52.722806  00 8E01E000 IODB     80495A50 EXE$DVI_FREEBLOCKS_C+00750     3B000125 Unlock Quad           FFFFFFFF.7C278A40

    Press RETURN for more.
SDA>
SDA> mtx unload
MTX$DEBUG unload status = 00000001
SDA>
```

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```
DECnet-Plus For OpenVMS System Dump Analyzer Extension
Use SHOW SUMMARY command to get a system overview

HELP

        DECnet-Plus System Dump Analyzer Extensions.

        These commands are intended for the use of Digital support
        personnel in the maintenance of DECnet-Plus for VMS.
        They have not been externally documented as they are subject
        to change.  The information displayed may not be clear
        to those not familiar with the internals of DECnet-Plus
        for VMS.  Thus, the HELP supplied with NET$SDA does not explain
        the information displayed in any detail.


  Additional information available:

  Invoking_NET$SDA      SDA_Commands          Restrictions          Symbols
  CLEAR      EXIT       QUIT       SET        SHOW
```

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```
%CLI-W-SYNTAX, error parsing 'NTDS'
```

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```
OLCA = On-Chip Logic Analyzer
```

```
OCLA - EV7 PC Tracing Utility commands:

        OCLA LOAD
        OCLA UNLOAD
        OCLA ENABLE  [/CPU=n][/RESET]
        OCLA DISABLE [/CPU=n]
        OCLA START   [/CPU=n]
        OCLA STOP    [/CPU=n]
        OCLA DUMP    [/CPU=n]
        OCLA SHOW STATUS [/CPU=n]
        OCLA SHOW TRACE [/CPU=n][/LAST=n][/SUMMARY][/SYMBOLS][/REVERSE]
        OCLA SHOW REGISTERS [/CPU=n]
```

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```
PC Sampling Utility PCS commands:

        PCS LOAD
        PCS UNLOAD
        PCS START TRACE [/BUFFER=pages] (Default=1280, good for minimal 19 minutes per CPU)
                        [/MINIPL=minimum ipl]
                        [/PID=pid]
                        [/TICKDELAY=ticks] (Default=10)
                        [/IDLE]
        PCS STOP  TRACE
        PCS SHOW  TRACE [/PID=pid]
                        [/IPL=ipl]
                        [/MINIPL=minimum ipl]
                        [/CPU=cpu]
                        [/STATISTICS]
                        [/FULL]
                        [/CONTINUOUS]
                        [/INTERVAL=seconds]
        PCS DUMP filename
                        [/RESET]
                        [/CSV]
        PCS ANALYZE filename [,filename...]
                        [/PID=pid]
                        [/IPL=ipl]
                        [/MINIPL=minimum ipl]
                        [/CPU=cpu]
                        [/STATISTICS]
                        [/FULL]
        PCS DEBUG

Example:

SDA> pcs load
PCS$DEBUG load status = 00000001
SDA> pcs start trace
Sampling started...
SDA> pcs stop trace
Sampling stopped...
SDA> pcs sho trace

PC sampler information:
-----------------------
Timestamp               CPU PC       IPL Pid      Routine                          Module
----------------------- --- -------- --- -------- -------------------------------- ------
11-MAY 12:13:31.930365  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.930281  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.930198  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.930106  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.930024  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929940  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929856  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929765  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929681  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929597  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929506  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929427  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929343  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929260  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929170  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929088  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7
11-MAY 12:13:31.929005  00 0003001A  0  46C000B1 SYS$K_VERSION_03+0001A           EXAMPLE_7

    Press RETURN for more.
SDA> pcs sho trace/stat

PC sampler information:
-----------------------
PC       IPL Pid      Count        Routine                          Module
-------- --- -------- ------------ -------------------------------- ------
0003001A  0  46C000B1         1154 SYS$K_VERSION_03+0001A           EXAMPLE_7
83ACB832  8  46C000B1            1 TCPIP$INTERNET_SERVICES+03832    TCPIP$INTERNET_SERVICES
805FCF90  8  46C000B1            1 LAN$RETURN_RCV_VCRP_C+00060      SYS$LAN
8015A65C  8  46C000B1            1 AMAC$EMUL_CALL_NATIVE_C+0007C    PROCESS_MANAGEMENT
80921E84  0  46C000B0            1 SCRSHR+21E84                     SCRSHR
8005DD1C  8  46C000B0            1 EXE_STD$KP_STARTIO_C+0009C       SYSTEM_PRIMITIVES_MIN
80012F3C 21  46C000B0            1 IOC$CRAM_IO_C+0007C              SYS$CPU_ROUTINES_0402
001D1832 15  46C000AF            1 TDC$LIBSHR$A_V820-0105+AB832     TDC$LIBSHR$A_V820-0105
80130668  0  46C0009D            1 PROCESS_MANAGEMENT+20668         PROCESS_MANAGEMENT
SDA>
SDA> pcs dump/csv test.tmp
SDA> spa
$ ty test.tmp
```

```
"Timestamp","CPU","PC","IPL","Pid","Routine","Module","RetPC","R2","R3","R4","R5","R6","R7"
"11-MAY 12:13:31.930365","00","0003001A","0","46C000B1","SYS$K_VERSION_03+0001A","EXAMPLE_7","0812A637","7FFCF87C","7AFBCEC2","7FFCF
814","7FFCF934","7FFA0ED0","7FFA0ED0"
"11-MAY 12:13:31.930281","00","0003001A","0","46C000B1","SYS$K_VERSION_03+0001A","EXAMPLE_7","08116164","7FFCF87C","7AFBCEC2","7FFCF
814","7FFCF934","7FFA0ED0","7FFA0ED0"
...
```

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```
PE

     This command executes the PEDRIVER specific SDA extension image
     which is a collection of PEDRIVER specific commands which mirror
     the display functions of SYS$SYSTEM:SCACP.EXE in SDA.

     By default this image is loaded from SYS$SHARE.  However, it can
     be redirected with the following logical:

        $ define pe$sda [dir-spec]pe$sda.exe

     Format:

        SDA> PE command


  Additional information available:

  BUS        CHANNEL    LAN_DEVICE TRACE      HELP       VC
```

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```
PKM command format:
  PKM SHOW DEVICES
  PKM SHOW RING [] [/(NO)ASCENDING]
  PKM SHOW MSG [] [/(NO)ASCENDING]
  PKM FORMAT
  PKM SHOW CONFIG []
  PKM SHOW CTR []
  PKM SET DEVICE
  PKM START RING [] [/ENTRIES=[|128(D)]] [/(NO)ALL]
  PKM STOP RING []
  PKM CLEAR RING []

  where  can be any of the following:
      the name of a PKM device (including the trailing '0', e.g. PKA0)
      the address of a PKM SPDT
      any expression that resolves to the address of a PKM SPDT

  The last legal value specified for  becomes the default.
  The default for  is flagged with '*' in the SHOW DEVICES output.
```

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```
Performance Tracing Utility PRF commands:
-----------------------------------------

        PRF LOAD                        - load PRF$DEBUG execlet
        PRF UNLOAD                      - unload PRF$DEBUG execlet

        PRF INFO                        - display processor and chip information
        PRF LIST  EVENTS                - brief display of all PMU events
                  [/FULL]               - list all details about PMU events
                  [/NAME=n]             - wildcard search for a given PMU event
        PRF SHOW  PMU                   - displays current PMU counters for each CPU

        PRF START MONITOR               - start monitoring of all PMU events
                  [/INTERVAL=n]         - interval to cycle through events (default = 1000000 retired instructions)
                  [/INDEX=pid]          - PID of process to monitor, default is ALL processes
        PRF STOP  MONITOR               - stop monitoring of PMU events
        PRF SHOW  MONITOR               - analyzes and displays report of monitored PMU events
                  [/COUNTER]            - displays the counter values of the PMU events monitored

        PRF START PC_SAMPLING           - start PC sampling
                  [/BUFFER=n]           - size of trace buffer
                  [/CPU=n]              - list of CPU's to run PC sampling (default is ALL active CPUs)
                  [/INDEX=pid]          - PID of process to run PC sampling (default is ALL processes)
                  [/EVENT=event_name]   - PMU event name to sample (default CPU_CYCLES)
                  [/THRESHOLD]          - threshold value for overflow counter (default 100000)
                  [/MODE=(K,E,S,U)]     - allows PC sampling for one or more specific modes (default is ALL modes)
        PRF STOP  PC_SAMPLING           - stop PC sampling

        PRF START PROFILE               - start miss event profiling
                  [/BUFFER=n]           - size of trace buffer
                  [/CPU=n]              - list of CPU's to run profiling (default is ALL active CPUs)
                  [/CACHE={L1,L2,L3}]   - trace instruction and data cache load misses (default, L1 cache)
                  [/INDEX=pid]          - PID of process to run profiling (default is ALL processes)
                  [/TLB]                - trace instruction and data TLB misses
                  [/THRESHOLD]          - threshold value for overflow counter
                  [/MODE=(K,E,S,U)]     - allows PC sampling for one or more specific modes (default is ALL modes)
        PRF STOP  PROFILE               - stop profiling

        PRF START COLLECT               - start collection of either PC sampling or profiling
```

```
                [/BEGIN=pc_range_low] - low VA for PC range
                [/END=pc_range_high]  - high VA for PC range
        PRF STOP  COLLECT             - stop collection
        PRF SHOW  COLLECT             - show results of PC sampling or profiling collection
                [/FULL]               - full details
                [/MIN=n]              - minimum threshold for records to be displayed
                [/THRESHOLD=f]        - minimum threshold percentage for records to be displayed
```

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PTHREAD SDA Extension:

```
    cache [-bcfrs]: list debug cache
    conditions [-afhwqs] [-N <n>] [id]...: list condition variables
    dump [-b]: dump debug info
    exit: exit from DECthreads debugger
    help [topic]: display help information
    keys [-av] [-N <n>] [id]...: list keys
    meter [-# <n>] [-C <c>,...] [-f] [-K <k>,...] [-l] [-M <m>,...]
        [-o [chpst]...] [-q] [-R <r>,...] [-s] [-T <t>,...] [-w] [-W <w>] [f]: trace summary
    mutexes [-afhilqws] [-N <n>] [id]...: list mutexes
    name <t$gt; <s$gt; <n$gt;: set name
    quit: exit from DECthreads debugger
    rad [-f] <n$gt;: show RAD state
    rwlocks [-afqrw] [-N <n$gt;] [id]...: list rwlocks
    show [-ackstu]: show stuff
    squeue [-c <n$gt;] [-fhq] [-t <t$gt;] [a]: format queue
    stacks [-fs] [sp]...: list stacks
    system: show system information
    threads [--] [-S <n>] [-l] [-N <n>] [-abcdfhklmnor] [-s <v$gt;] [-tz] [id]...: list threads
    trace [-# <n>,<m>] [-c [achlpst]] [-C <n>,...] [-d <n>] [-f] [-F <f>,...]
        [-G <g>] [-K <n>,...] [-l] [-M <n>,...] [-N <n>,...] [-o [cstS]...]
        [-O <o>,...] [-P <p$gt;,...] [-q] [-R <n$gt;,...] [-s] [-S <s$gt;,...] [-t] [-T <n>,...]
        [-v] [-V <v>] [-w] [-W <w$gt;] [f]: trace stream
    tset [-ca] [-s <v>] <id>: set state of thread
    versions: display versions
    vm [-cf]: list internal VM
    vp [-fl]: show VP state
    write <st>: write a string
All keywords may be abbreviated: if the abbreviation is ambiguous, the first
match will be used. For more help, type 'help <topic>'.
```

Example: Memory leak in a PTHREAD program

```
SDA> pthread vm
lookaside 0 (32 bytes; obj-name) 585866 in use, 1 free
lookaside 1 (256 bytes; hash-bucket) 187 in use, 0 free
lookaside 2 (384 bytes; rwb, mub, cvb) 586318 in use, 0 free
lookaside 3 (4096 bytes; tsd-array) 0 in use, 0 free
lookaside 4 (4288 bytes; mu-meter) 0 in use, 0 free
lookaside 5 (4352 bytes; cv-meter) 0 in use, 0 free
lookaside 6 (8192 bytes; tcb) 0 in use, 0 free

memory used: 32*585866 + 384*586318 = 243893824 = 250 MB
```

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PWIP:

```
HELP

DEBUG [ON]
DEBUG OFF
DEBUG BREAKPOINT

PWIP HEADER
PWIP DATAGRAMS [ BRIEF | FULL | RAW | NUM ]
PWIP LISTENERS [ BRIEF | FULL | RAW | NUM ]
PWIP SESSIONS  [ BRIEF | FULL | RAW | NUM ]
PWIP [ALL]     ( BRIEF of Datagrams, Listeners & Sessions)
PWIP TRACE
PWIP DEFAULT   [ BRIEF | FULL | RAW ] (When NUM specified)
```

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```
SDA> rms

RMS Utility - Quick Help Information
------------------------------------
RMS commands: LOAD, UNLOAD
              START TRACE, STOP TRACE, SHOW TRACE

        RMS LOAD                    - load RMS$DEBUG execlet
        RMS UNLOAD                  - unload RMS$DEBUG execlet
        RMS START TRACE             - start tracing everything
                [/BUFFER=n]         - size of trace buffer (in Alpha Pages, default 128 = 1MB)
                [/[NO]BUCKET]       - trace or ignore RMS bucket locks
                [/[NO]RECORD]       - trace or ignore RMS record locks
                [/[NO]NULL]         - trace or ignore Null-mode locks
                [/FILE=filespec]    - trace only for specific file
```

```
        RMS STOP  TRACE              - stop tracing
        RMS SHOW  TRACE              - decode and display trace buffer entries
                  [/SUMMARY]         - summary per file with top buckets
                  [/[NO]BUCKET]      - display or ignore RMS bucket locks
                  [/[NO]RECORD]      - display or ignore RMS record locks
                  [/[NO]NULL]        - display or ignore Null-mode locks
                  [/FILE=filespec]   - only display locks for specific file
                  [/TOPFILES=n]      - only display the top-n ranked files
                  [/TOPBUCKETS=n]    - only display the top-n buckets per file

SDA>

Example:

SDA> rms load
RMS$DEBUG load status = 00000001
SDA> rms start trace
Tracing started...
SDA> spa set ho 0

 Welcome to HP OpenVMS I64, Version V8.2-1

Username: system
Password:
   HP OpenVMS Industry Standard 64 Operating System, Version V8.2-1 on node I64VMS
    Last interactive login on Thursday, 18-MAY-2006 07:40:54.49
    Last non-interactive login on Tuesday,  6-DEC-2005 15:06:28.62
$ logo
  SYSTEM       logged out at 18-MAY-2006 07:44:37.37
%REM-S-END, control returned to node I64VMS::
SDA> rms stop trace
Tracing stopped...
SDA> rms show trace

RMS Trace Information:
----------------------
      Timestamp          VolumeLock      FileId        VBN     Rec    PID    GR RQ Func  LKB / Parent LKB   RSB / Parent RSB
---------------------  ------------ --------------  --------  ---- -------- -- -- ----  ----------------  ----------------
18-MAY 07:44:35.161985  I64G01-SYS   000014,0001,00  00000024       00010019 EX NL Conv  FFFFFFFF.7F004940  FFFFFFFF.7F02ED00
                                                                                          FFFFFFFF.7F003200  FFFFFFFF.7F00CE40
18-MAY 07:44:35.153629  I64G01-SYS   000014,0001,00  00000024       00010019 NL EX Conv  FFFFFFFF.7F004940  FFFFFFFF.7F02ED00
                                                                                          FFFFFFFF.7F003200  FFFFFFFF.7F00CE40
18-MAY 07:44:35.153627  I64G01-SYS   000014,0001,00  00000004       00010019 EX NL Conv  FFFFFFFF.7F02A300  FFFFFFFF.7F02EF80
                                                                                          FFFFFFFF.7F003200  FFFFFFFF.7F00CE40
18-MAY 07:44:35.153623  I64G01-SYS   000014,0001,00  00000004       00010019 NL EX Conv  FFFFFFFF.7F02A300  FFFFFFFF.7F02EF80
                                                                                          FFFFFFFF.7F003200  FFFFFFFF.7F00CE40
18-MAY 07:44:35.153608  I64G01-SYS   000014,0001,00  00000024       00010019 EX NL Conv  FFFFFFFF.7F004940  FFFFFFFF.7F02ED00
                                                                                          FFFFFFFF.7F003200  FFFFFFFF.7F00CE40
18-MAY 07:44:35.153601  I64G01-SYS   000014,0001,00  00000004  0002 00010019    PW New   FFFFFFFF.7F02A1C0  FFFFFFFF.7F02EE40
                                                                                          FFFFFFFF.7F003200  FFFFFFFF.7F00CE40
18-MAY 07:44:35.153595  I64G01-SYS   000014,0001,00  00000024       00010019 NL EX Conv  FFFFFFFF.7F004940  FFFFFFFF.7F02ED00
                                                                                          FFFFFFFF.7F003200  FFFFFFFF.7F00CE40
18-MAY 07:44:35.153592  I64G01-SYS   000014,0001,00  00000004       00010019 EX NL Conv  FFFFFFFF.7F02A300  FFFFFFFF.7F02EF80
                                                                                          FFFFFFFF.7F003200  FFFFFFFF.7F00CE40
18-MAY 07:44:35.153575  I64G01-SYS   000014,0001,00  00000004       00010019    EX New   FFFFFFFF.7F02A300  FFFFFFFF.7F02EF80

    Press RETURN for more.
SDA> rms show trace/summ

RMS Trace Information: (timestamp 18-MAY-2006 07:44:58.32,  delta time    0 00:00:03.11)
-------------------------------------------------------------------------------
TotEntries    Bucket-VBN      TotCount    Filename
----------    ----------    ----------    --------------------------------------------------------------------------------
*       39                                DISK$I64G01-SYS:[VMS$COMMON.SYSEXE]RIGHTSLIST.DAT;1
                      14             9
                       4             6
                      17             6
                      10             4
                       8             4
                      21             4
                       1             2
                       2             2
                      19             2
*       18                                DISK$I64G01-SYS:[VMS$COMMON.SYSEXE]SYSUAF.DAT;1
                      36             6
                       4             6
                       1             2
                       2             2
                       7             2
*        7                                DISK$I64G01-SYS:[VMS$COMMON.SYSEXE]VMSMAIL_PROFILE.DATA;1
                       3             3
                       1             2
                       8             2
SDA> rms unload
RMS$DEBUG unload status = 00000001
SDA>  Exit
```

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```
Debug Tracing Utility SHAD commands:
        SHAD LOAD
        SHAD UNLOAD
        SHAD START TRACE [/BUFFER=pages]
        SHAD STOP  TRACE
        SHAD SHOW  TRACE
```

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```
Spinlock Tracing Utility SPL commands:
        SPL LOAD
        SPL UNLOAD
        SPL START TRACE [/[NO]SPINLOCK=spinlock] [/[NO]FORKLOCK=forklock] [/BUFFER=pages]
                        [/[NO]ACQUIRE] [/[NO]RELEASE] [/[NO]WAIT]
                        [/[NO]FRKDSPTH] [/[NO]FRKEND]
                        [/CPU=n] [/LCKMGR]
        SPL STOP  TRACE
        SPL SHOW  TRACE [/[NO]SPINLOCK=(spinlock[,...])] [/[NO]FORKLOCK=(forklock[,...])]
                        [/SUMMARY [/RATES or /TOTALS]]
                        [/[NO]ACQUIRE] [/[NO]RELEASE] [/[NO]WAIT]
                        [/[NO]FRKDSPTH] [/[NO]FRKEND]
                        [/CPU=n] [/TOP=n]
        SPL START COLLECT /SPINLOCK=spinlock or /ADDRESS=n
        SPL STOP  COLLECT
        SPL SHOW  COLLECT [/RATES or /TOTALS]
        SPL ANALYZE       [/[NO]CPU_STATISTICS] [/[NO]HOLD_TIMES=]
                          [/[NO]PLATFORM]       [/[NO]WAIT_TIMES=]
                          [/[NO]USAGE=(HOLD=, SPIN=, TOP_PCS=)]


See SYS$EXAMPLES:SPL.COM

$ @sys$examples:spl
Collecting Spinlock Trace Data

OpenVMS (TM) system analyzer

SPL$DEBUG load status = 00000001
Tracing started... (Spinlock = 00000000, Forklock = 00000000)
Creating nod20_SPL_11MAY2006_1314.TXT

OpenVMS (TM) system analyzer

Tracing stopped...
Created nod20_SPL_11MAY2006_1314.TXT
$

        Platform
        -------------------------------------------------
        Node:           nod20
        Hardware:       AlphaServer ES40
        Active CPUs:    3
        Memory:         4.00 GB
        CPU Frequency:  833 MHz

        Trace Buffer:   1000 pages (7.81 MB)
        Trace Time:     1.75 seconds
        Trace Start:    11-MAY 13:14:34.312028

CPU statistics
                % Time in           % Time          % Time      All Spinlocks  All Spinlocks
CPU ID    Fork Dispatcher   Spinlocks Held       MP_Synch       Acquires/sec      Waits/sec
------    ---------------   --------------      ----------      -------------  -------------
    00               2.3              3.8             0.2            12748.7          289.3
    01               2.1              4.8             0.3            19238.9          270.5
    02               2.7              9.4             0.5            35397.3          375.5
------    ---------------   --------------      ----------      -------------  -------------
 Total               7.1             18.0             0.9            67384.8          935.3

Spinlock Usage
                                                                                                  Spin to
Spinlock      % Time Held   Acquires/sec   Average Hold    % Time Spinning      Waits/sec   Average Spin   Hold Ratio
------------  -----------   ------------   ------------    ---------------   ------------   ------------  -----------


Long Spinlock Hold Times (> 1000 microseconds)

Timestamp              CPU Spinlock | Forklock   Calling PC | Forking PC                EPID      Hold (us)
---------------------- --- -------------------- ---------- ------------------------------ --------  ---------
11-MAY 13:14:35.258258  00 8863A800 LCKMGR       80377A50 LCK$RRSCAN_C+000F0             00000000       2224


                Events    Acquires    Releases     Acq Own  Acq NoSpin   Spinwaits          %
Spinlock          /sec        /sec        /sec        /sec        /sec        /sec    Spinwait
-----------  ----------  ----------  ----------  ----------  ----------  ----------  ----------
MEGA               1.1         0.6         0.6         0.0         0.0         0.0         0.0
HWCLK           2048.7      1024.3      1024.3         0.0         0.0         0.0         0.0
INVALIDATE       162.1        81.0        81.0         0.0         0.0         0.0         0.0
SCHED          11610.8      5673.6      5679.3         0.0         5.7       252.2         4.4
MMG             5496.7      2745.5      2745.5         0.0         0.0         5.7         0.2
TIMER           2118.9      1059.2      1059.2         0.0         0.0         0.6         0.1
TX_SYNCH        1095.7       547.8       547.8         0.0         0.0         0.0         0.0
IOLOCK8        31763.8     14687.8     15568.3       880.5         0.0       627.2         4.3
LCKMGR          5246.7      2373.4      2622.8         0.0       249.4         1.1         0.0
FILSYS         12235.1      6100.4      6100.4         0.0         0.0        34.2         0.6
QUEUEAST         190.6        95.3        95.3         0.0         0.0         0.0         0.0
???            63733.7     25822.1     31859.1       386.3      5651.9        14.3         0.0
-----------  ----------  ----------  ----------  ----------  ----------  ----------  ----------
              135703.8     60211.0     67383.7      1266.9      5907.0       935.3         1.4


               Events    Acquires  or   Spins     %    Own
Spinlock         /sec    Releases/sec    /sec  Spin   /sec Caller's PC                          Module                          Offset
---------- ---------- --------------- ------- ----- ------ ---------- ------------------------- ------------------------------- --------

MEGA              0.6       0.6 Rel/s     0.0   0.0    0.0 80051574  EXE$TIMEOUT_C+006F4       SYSTEM_PRIMITIVES_MIN     00021574
MEGA              0.6       0.6 Acq/s     0.0   0.0    0.0 80051394  EXE$TIMEOUT_C+00514       SYSTEM_PRIMITIVES_MIN     00021394
```

HWCLK	1024.3	1024.3	Rel/s	0.0	0.0	0.0	80051B24	EXE$INTERVAL_TIMER_INT_C+001	SYSTEM_PRIMITIVES_MIN	00021B24
HWCLK	1024.3	1024.3	Acq/s	0.0	0.0	0.0	800519F4	EXE$INTERVAL_TIMER_INT_C+000	SYSTEM_PRIMITIVES_MIN	000219F4
INVALIDATE	81.0	81.0	Rel/s	0.0	0.0	0.0	801C3FB8	MMG$TBI_DATA_64_THREADS_C+00	SYS$VM	0004FFB8
INVALIDATE	81.0	81.0	Acq/s	0.0	0.0	0.0	801C3BAC	MMG$TBI_DATA_64_THREADS_C+00	SYS$VM	0004FBAC
SCHED	1846.7	1749.7	Acq/s	97.0	5.5	0.0	80128FBC	SCH$IDLE_C+0025C	PROCESS_MANAGEMENT	00000FBC
SCHED	1749.1	1749.1	Rel/s	0.0	0.0	0.0	80128DD8	SCH$IDLE_C+00078	PROCESS_MANAGEMENT	00000DD8
SCHED	1483.7	1384.4	Acq/s	99.3	7.2	0.0	801570C0	SCH$QAST_C+00510	PROCESS_MANAGEMENT	0002F0C0
SCHED	1395.8	1395.8	Rel/s	0.0	0.0	0.0	801544C0	SCH$INTERRUPT+00800	PROCESS_MANAGEMENT	0002C4C0
SCHED	1385.0	1357.0	Acq/s	28.0	2.1	0.0	8015D1CC	EXE$SYNCH_INT_C+0061C	PROCESS_MANAGEMENT	000351CC
SCHED	1384.4	1384.4	Rel/s	0.0	0.0	0.0	80156DA0	SCH$QAST_C+001F0	PROCESS_MANAGEMENT	0002EDA0
SCHED	431.4	431.4	Rel/s	0.0	0.0	0.0	80154430	SCH$INTERRUPT+00770	PROCESS_MANAGEMENT	0002C430
SCHED	251.1	249.4	Acq/s	1.7	0.7	0.0	80371A40	LCK$DEALLOC_LKB_C+00200	SYS$CLUSTER	00027A40
SCHED	249.4	249.4	Rel/s	0.0	0.0	0.0	80371AB4	LCK$DEALLOC_LKB_C+00274	SYS$CLUSTER	00027AB4
SCHED	249.4	249.4	Acq/s	0.0	0.0	0.0	8036DED8	LCK$SND_LOCKREQ_C+00138	SYS$CLUSTER	00023ED8
MMG	777.2	775.0	Acq/s	2.3	0.3	0.0	80179624	MMG_STD$IOLOCK_BUF_C+00204	SYS$VM	00005624
MMG	775.5	775.0	Acq/s	0.6	0.1	0.0	80179EFC	MMG_STD$IOUNLOCK_BUF_C+0007C	SYS$VM	00005EFC
MMG	775.0	775.0	Rel/s	0.0	0.0	0.0	801796A8	MMG_STD$IOLOCK_BUF_C+00288	SYS$VM	000056A8
MMG	775.0	775.0	Rel/s	0.0	0.0	0.0	80179F20	MMG_STD$IOUNLOCK_BUF_C+000A0	SYS$VM	00005F20
MMG	278.5	276.8	Acq/s	1.7	0.6	0.0	8017A24C	MMG$LOCK_SYSTEM_PAGES_C+0010	SYS$VM	0000624C
MMG	276.8	276.8	Rel/s	0.0	0.0	0.0	8017A2E4	MMG$LOCK_SYSTEM_PAGES_C+001A	SYS$VM	000062E4
MMG	275.6	275.6	Rel/s	0.0	0.0	0.0	8017A600	MMG$UNLOCK_SYSTEM_PAGES_C+00	SYS$VM	00006600
MMG	275.6	275.6	Acq/s	0.0	0.0	0.0	8017A564	MMG$UNLOCK_SYSTEM_PAGES_C+00	SYS$VM	00006564
MMG	138.1	137.0	Acq/s	1.1	0.8	0.0	8017D210	MMG$PAGEFAULT_C+000F0	SYS$VM	00009210
MMG	88.5	88.5	Rel/s	0.0	0.0	0.0	80198CEC	MMG_STD$SET_GH_AND_FASTMAP_6	SYS$VM	00024CEC
TIMER	379.5	379.5	Acq/s	0.0	0.0	0.0	80050830	EXE$SWTIMER_FORK_C+002A0	SYSTEM_PRIMITIVES_MIN	00020830
TIMER	325.3	325.3	Rel/s	0.0	0.0	0.0	8005088C	EXE$SWTIMER_FORK_C+002FC	SYSTEM_PRIMITIVES_MIN	0002088C
TIMER	299.6	299.6	Acq/s	0.0	0.0	0.0	800503BC	EXE_STD$IOFORK_CPU_C+0047C	SYSTEM_PRIMITIVES_MIN	000203BC
TIMER	299.6	299.6	Rel/s	0.0	0.0	0.0	800503FC	EXE_STD$IOFORK_CPU_C+004BC	SYSTEM_PRIMITIVES_MIN	000203FC
TIMER	207.2	207.2	Acq/s	0.0	0.0	0.0	80057158	EXE$INSTIMQ_C+00068	SYSTEM_PRIMITIVES_MIN	00027158
TIMER	207.2	207.2	Rel/s	0.0	0.0	0.0	800571C4	EXE$INSTIMQ_C+000D4	SYSTEM_PRIMITIVES_MIN	000271C4
TIMER	116.4	116.4	Acq/s	0.0	0.0	0.0	8014D9F4	EXE$SCHDWK_C+002B4	PROCESS_MANAGEMENT	000259F4
TIMER	116.4	116.4	Rel/s	0.0	0.0	0.0	8014DA98	EXE$SCHDWK_C+00358	PROCESS_MANAGEMENT	00025A98
TIMER	55.4	54.8	Acq/s	0.6	1.0	0.0	8014DE24	EXE$SETIMR_C+00234	PROCESS_MANAGEMENT	00025E24
TIMER	54.8	54.8	Rel/s	0.0	0.0	0.0	8014DEF4	EXE$SETIMR_C+00304	PROCESS_MANAGEMENT	00025EF4
TX_SYNCH	547.8	547.8	Rel/s	0.0	0.0	0.0	802BEF68	EXE$GENERATE_UID_C+00298	SYS$TRANSACTION_SERVICES	00018F68
TX_SYNCH	547.8	547.8	Acq/s	0.0	0.0	0.0	802BED34	EXE$GENERATE_UID_C+00064	SYS$TRANSACTION_SERVICES	00018D34
IOLOCK8	2255.8	2162.3	Acq/s	93.6	4.3	0.0	8A8B6FB0	TCPIP$INTERNET_SERVICES+18FB	TCPIP$INTERNET_SERVICES	00018FB0
IOLOCK8	2196.5	2162.3	Acq/s	34.2	1.6	0.0	8A8B8BDC	TCPIP$INTERNET_SERVICES+1ABD	TCPIP$INTERNET_SERVICES	0001ABDC
IOLOCK8	2162.3	2162.3	Rel/s	0.0	0.0	0.0	8A8B737C	TCPIP$INTERNET_SERVICES+1937	TCPIP$INTERNET_SERVICES	0001937C
IOLOCK8	2162.3	2162.3	Rel/s	0.0	0.0	0.0	8A8B8C10	TCPIP$INTERNET_SERVICES+1AC1	TCPIP$INTERNET_SERVICES	0001AC10
IOLOCK8	1153.3	1109.4	Acq/s	43.9	4.0	0.0	800F0184	EXE$CANCEL_C+001C4	IO_ROUTINES	0001A184
IOLOCK8	1145.3	1095.7	Acq/s	49.6	4.5	0.0	800503BC	EXE_STD$IOFORK_CPU_C+0047C	SYSTEM_PRIMITIVES_MIN	000203BC
IOLOCK8	1109.4	1109.4	Rel/s	0.0	0.0	0.0	800F05C8	EXE$CANCEL_C+00608	IO_ROUTINES	0001A5C8
IOLOCK8	1095.7	1095.7	Rel/s	0.0	0.0	0.0	800503FC	EXE_STD$IOFORK_CPU_C+004BC	SYSTEM_PRIMITIVES_MIN	000203FC
IOLOCK8	831.5	789.8	Acq/s	41.7	5.3	0.0	804748F4	SYS$DKDRIVER+028F4	SYS$DKDRIVER	000028F4
IOLOCK8	824.6	770.4	Acq/s	54.2	7.0	0.0	800E95E4	IOC$INITIATE_PORT_CPU_C+0004	IO_ROUTINES	000135E4
LCKMGR	1125.9	1125.9	Rel/s	0.0	0.0	0.0	801D1610	LOCKING+01610	LOCKING	00001610
LCKMGR	996.4	996.4	Acq/s	0.0	0.0	0.0	801D5400	EXE$DEQ_C+000F0	LOCKING	00005400
LCKMGR	996.4	996.4	Rel/s	0.0	0.0	0.0	801D5AEC	EXE$DEQ_C+007DC	LOCKING	00005AEC
LCKMGR	652.3	652.3	Acq/s	0.0	0.0	0.0	801D1ECC	LOCKING+01ECC	LOCKING	00001ECC
LCKMGR	369.8	369.2	Acq/s	0.6	0.2	0.0	801D285C	LOCKING+0285C	LOCKING	0000285C
LCKMGR	250.0	249.4	Acq/s	0.6	0.2	0.0	8036DF30	LCK$SND_LOCKREQ_C+00190	SYS$CLUSTER	00023F30
LCKMGR	249.4	249.4	Rel/s	0.0	0.0	0.0	8036DEF4	LCK$SND_LOCKREQ_C+00154	SYS$CLUSTER	00023EF4
LCKMGR	249.4	249.4	Acq/s	0.0	0.0	0.0	80358210	CNX$RCV_MSG_C+00070	SYS$CLUSTER	0000E210
LCKMGR	249.4	249.4	Rel/s	0.0	0.0	0.0	80358240	CNX$RCV_MSG_C+000A0	SYS$CLUSTER	0000E240
LCKMGR	104.4	104.4	Acq/s	0.0	0.0	0.0	801D09D0	EXE$ENQ_C+00900	LOCKING	000009D0
FILSYS	976.4	945.0	Acq/s	31.4	3.3	0.0	800EC374	IOC_STD$MAPVBLK_C+000B4	IO_ROUTINES	00016374
FILSYS	945.0	945.0	Rel/s	0.0	0.0	0.0	800EC55C	IOC_STD$MAPVBLK_C+0029C	IO_ROUTINES	0001655C
FILSYS	563.8	562.7	Acq/s	1.1	0.2	0.0	80215184	SET_DIRINDX_C+00030	F11BXQP	0000D184
FILSYS	562.7	562.7	Rel/s	0.0	0.0	0.0	802151B4	SET_DIRINDX_C+00060	F11BXQP	0000D1B4
FILSYS	545.6	545.6	Rel/s	0.0	0.0	0.0	8021DDB0	ALLOCATE_C+00174	F11BXQP	00015DB0
FILSYS	545.6	545.6	Acq/s	0.0	0.0	0.0	8021DD14	ALLOCATE_C+000D8	F11BXQP	00015D14
FILSYS	542.7	542.1	Acq/s	0.6	0.1	0.0	8021E500	DEALLOCATE_C+00084	F11BXQP	00016500
FILSYS	542.1	542.1	Rel/s	0.0	0.0	0.0	8021E584	DEALLOCATE_C+00108	F11BXQP	00016584
FILSYS	462.8	462.2	Acq/s	0.6	0.1	0.0	8021EEBC	SEARCH_FCB_C+00604	F11BXQP	00016EBC
FILSYS	462.2	462.2	Rel/s	0.0	0.0	0.0	8020D0BC	START_REQUEST_C+000BC	F11BXQP	000050BC
QUEUEAST	95.3	95.3	Rel/s	0.0	0.0	0.0	800503FC	EXE_STD$IOFORK_CPU_C+004BC	SYSTEM_PRIMITIVES_MIN	000203FC
QUEUEAST	95.3	95.3	Acq/s	0.0	0.0	0.0	800503BC	EXE_STD$IOFORK_CPU_C+0047C	SYSTEM_PRIMITIVES_MIN	000203BC
???	4289.1	4289.1	Rel/s	0.0	0.0	0.0	80156DBC	SCH$QAST_C+0020C	PROCESS_MANAGEMENT	0002EDBC
???	4287.4	4228.6	Acq/s	0.0	0.0	58.8	80156C58	SCH$QAST_C+000A8	PROCESS_MANAGEMENT	0002EC58
???	4197.2	4196.7	Acq/s	0.6	0.0	0.0	80156284	SCH$ASTDEL_K_C+00074	PROCESS_MANAGEMENT	0002E284
???	3561.0	3559.8	Acq/s	1.1	0.0	0.0	8015638C	SCH$ASTDEL_K_C+0017C	PROCESS_MANAGEMENT	0002E38C
???	3559.8	3559.8	Rel/s	0.0	0.0	0.0	801562C0	SCH$ASTDEL_K_C+000B0	PROCESS_MANAGEMENT	0002E2C0
???	3280.8	3280.8	Rel/s	0.0	0.0	0.0	80155BE8	SCH$ASTDEL_C+004A8	PROCESS_MANAGEMENT	0002DBE8
???	2340.3	2338.6	Acq/s	1.7	0.1	0.0	8A8BA050	TCPIP$INTERNET_SERVICES+1C05	TCPIP$INTERNET_SERVICES	0001C050
???	2340.3	2338.6	Acq/s	1.7	0.1	0.0	8A8B9E34	TCPIP$INTERNET_SERVICES+1BE3	TCPIP$INTERNET_SERVICES	0001BE34
???	2338.6	2338.6	Rel/s	0.0	0.0	0.0	8A8B9EA4	TCPIP$INTERNET_SERVICES+1BEA	TCPIP$INTERNET_SERVICES	0001BEA4
???	2338.6	2338.6	Rel/s	0.0	0.0	0.0	8A8BA0C8	TCPIP$INTERNET_SERVICES+1C0C	TCPIP$INTERNET_SERVICES	0001C0C8

	Total	CPU ID		
Forklock	Events/sec	0	1	2
IPL 06	2.3	0.0	2.3	0.0
IPL 08	3699.6	575.2	1597.9	1526.5
TIMER	299.6	299.6	0.0	0.0
IOLOCK8	1095.7	39.9	646.6	409.2
QUEUEAST	95.3	94.7	0.0	0.6
Totals	5192.5	1009.5	2246.7	1936.3

Forklock Trace Information:

Forklock	Event/sec	% Time Held	Average	Minimum	Maximum	Fork PC	
IPL 06	2.3	0.0	14727	7554	23785	80302400	XFCCOMMONFORKDISPATCH_C
Totals	2.3	0.0					
IPL 08	1099.7	1.3	9559	2967	51747	806354E0	SYS$EW1000A+054E0
IPL 08	782.4	1.4	15398	9001	113879	80430400	SYS$FGEDRIVER+02400
IPL 08	770.4	1.3	14453	8224	168632	800E95A0	IOC$INITIATE_PORT_CPU_C
IPL 08	546.1	0.6	9608	2728	98219	80677F48	EXEC.FORK_C+00150
IPL 08	498.2	0.2	2899	1287	8418	80650190	LAN$COMPLETE_XMT_CSMACD_C+00460
IPL 08	2.3	0.0	10285	7574	14936	8065A710	SYS$EIDRIVER+04710
IPL 08	0.6	0.0	7094	7094	7094	80689958	CC.FORK_C+00090
Totals	3699.6	4.8					
TIMER	299.6	0.7	18091	418	2377925	80050590	EXE$SWTIMER_FORK_C
Totals	299.6	0.7					
IOLOCK8	469.7	0.3	5714	1615	34836	800E9500	IOC_STD$INITIATE_NEW_IO_C+00490
IOLOCK8	214.6	0.1	2158	721	33359	8064F7F0	SYS$LAN_CSMACD+097F0
IOLOCK8	206.0	0.4	15674	4623	40444	8A8BEA30	TCPIP$INTERNET_SERVICES+20A30
IOLOCK8	154.7	0.1	6072	1285	16536	80650190	LAN$COMPLETE_XMT_CSMACD_C+00460
IOLOCK8	30.2	0.1	26319	5393	41997	8A8BE7F0	TCPIP$INTERNET_SERVICES+207F0
IOLOCK8	17.7	0.0	2322	547	4227	80421260	SYS$TTDRIVER+07260
IOLOCK8	0.6	0.0	32582	32582	32582	808C0820	OSITP$NRLRECEIVE_C
IOLOCK8	0.6	0.0	3920	3920	3920	808B1648	OSITP$LAYER3TRANSMITCOMPLETE_C
IOLOCK8	0.6	0.0	72120	72120	72120	80891858	OSITP$TIMERPROCESSREQUEST_C
Totals	1095.1	1.0					
QUEUEAST	89.0	0.6	56838	43368	94062	8AA80850	ECP$DRIVER+06850
QUEUEAST	1.7	0.0	7339	6900	7805	800FF3A0	COM_STD$DELATTNASTP_C+00170
QUEUEAST	0.6	0.0	7765	7765	7765	800ED910	IOC_STD$FREE_UCB_C+00050
Totals	91.3	0.6					
Totals	5187.9	7.1					

Spinlock Trace Information for SCHED:

CPU ID	% Time Held	Acquires/sec	Average Hold	% Time Spinning	Waits/sec	Average Spin	Spin to Hold Ratio
00	0.4	1207.5	3013	0.0	117.0	2775	0.09
01	0.6	1381.0	3420	0.0	57.1	3028	0.04
02	0.9	3090.7	2447	0.0	78.2	3343	0.03
	1.9	5679.3	2804	0.1	252.2	3008	0.05

Spinlock Trace Information for SCHED: (11-MAY-2006 13:14:45.38, 1.2 nsec, 833 MHz)

Caller's PC		% Time Held	Acquires /sec	Maximum	Minimum	Average	Spinwaits /sec	Average Spinwait	% Time Spin
80128FBC	SCH$IDLE_C+0025C	0.7	1749.7	34814	1141	3547	97.0	3161	0.0
8015D1CC	EXE$SYNCH_INT_C+0061C	0.5	1357.0	34439	1147	2884	28.0	3706	0.0
801570C0	SCH$QAST_C+00510	0.3	1384.4	8379	291	2005	99.3	2595	0.0
8036DED8	LCK$SND_LOCKREQ_C+00138	0.1	249.4	7680	1773	3072	0.0	0	0.0
800508F0	EXE$SWTIMER_FORK_C+00360	0.1	118.1	13536	1346	4359	6.3	3083	0.0
80149954	EXE$HIBER_INT_C+00214	0.0	146.1	9908	1113	2539	1.1	3957	0.0
80371A40	LCK$DEALLOC_LKB_C+00200	0.0	249.4	4112	694	1342	1.7	5416	0.0
800506E0	EXE$SWTIMER_FORK_C+00150	0.0	54.2	11554	2694	5265	2.9	2207	0.0
80153D24	SCH$INTERRUPT+00064	0.0	39.9	10088	1306	4957	2.9	4218	0.0
80134430	SCH$QEND_C+00080	0.0	49.6	9277	701	2634	6.3	3557	0.0
8017EFEC	SYS$VM+0AFEC	0.0	29.7	5654	1880	3158	0.0	0	0.0
8027E8F8	NSA$STORE_PERSONA_C+000E8	0.0	79.3	2424	445	973	0.6	1191	0.0
80159C30	SCH$POSTEF_C+00050	0.0	26.3	7267	695	2644	0.6	1540	0.0
8027E6A4	NSA$REMOVE_PERSONA_C+000A4	0.0	79.3	2908	322	764	1.1	2731	0.0
800E33B4	IOC$IOPOST_C+00E14	0.0	29.7	3288	1287	1633	1.1	2849	0.0
801353A8	SCH$WAKE_NOT_ME_C+00048	0.0	14.8	5590	699	2145	1.1	3047	0.0
8004E2D0	SCH$UNLOCK_QUAD_C+000E0	0.0	7.4	3479	407	1943	1.7	2098	0.0
8004D658	SCH$LOCKW_QUAD_C+001A8	0.0	4.6	4830	584	2322	0.0	0	0.0
801471C8	EXE$RESCHED_C+00088	0.0	5.7	2517	336	1320	0.0	0	0.0
8015BDDC	EXE$WFLAND_COMMON_C+000DC	0.0	0.6	8588	8588	8588	0.0	0	0.0
8004DCE0	SCH$LOCKR_QUAD_C+00190	0.0	1.1	4796	879	2837	0.0	0	0.0
80128B7C	SCH$CALC_CPU_LOAD_C+0006C	0.0	1.1	1531	1415	1473	0.6	3250	0.0
80050EE0	EXE$TIMEOUT_C+00060	0.0	0.6	2075	2075	2075	0.0	0	0.0
801335B8	SCH_STD$UNWAIT_C+000E8	0.0	0.6	658	658	658	0.0	0	0.0
800EDC98	IOC_STD$CREDIT_UCB_C+00088	0.0	0.6	644	644	644	0.0	0	0.0

Spinlock Trace Information for IOLOCK8:

CPU ID	% Time Held	Acquires/sec	Average Hold	% Time Spinning	Waits/sec	Average Spin	Spin to Hold Ratio
00	1.8	2842.5	5341	0.1	166.1	7490	0.08
01	1.7	3842.9	3622	0.2	190.0	9624	0.13
02	3.6	8049.8	3762	0.4	271.1	11592	0.10
	7.1	14735.2	4030	0.7	627.2	9910	0.10

Spinlock Trace Information for IOLOCK8: (11-MAY-2006 13:14:50.48, 1.2 nsec, 833 MHz)

Caller's PC		% Time Held	Acquires /sec	Maximum	Minimum	Average	Spinwaits /sec	Average Spinwait	% Time Spin
800503BC	EXE_STD$IOFORK_CPU_C+0047C	1.0	1095.7	54880	879	7743	49.6	8240	0.0
800FE99C	EXE_STD$INSIOQ_C+0007C	0.8	775.0	47797	837	8228	28.0	12487	0.0
8043048C	SYS$FGEDRIVER+0248C	0.7	783.0	18918	4944	7714	29.7	9640	0.0
8AA81D58	ECP$DRIVER+07D58	0.5	93.0	77859	36964	49071	4.6	3958	0.0

804FAFB4	SHTD$INSIOQC_SINGLE_CLN_C+004B4	0.5	760.1	31078	2041	5579	24.5	10640	0.0
80370E20	LCK$SND_RMVDIR_C+00090	0.5	247.7	43579	12475	17055	6.3	10532	0.0
8A8AAAF8	TCPIP$INTERNET_SERVICES+0CAF8	0.5	160.4	67005	276	25416	14.3	6709	0.0
8036DDF8	LCK$SND_LOCKREQ_C+00058	0.5	249.4	30608	9375	15177	18.3	13481	0.0
800E95E4	IOC$INITIATE_PORT_CPU_C+00044	0.4	770.4	36187	2430	4621	54.2	7501	0.0
8067B1F8	PEM$PCI_INTR_C+000A8	0.3	497.6	93017	857	5308	12.6	13097	0.0
80441448	SYS$FGEDRIVER+13448	0.2	789.8	9738	1546	2423	31.4	8545	0.0
8A8AA8A8	TCPIP$INTERNET_SERVICES+0C8A8	0.2	288.2	14132	1678	6053	18.8	5602	0.0
8A8B6FB0	TCPIP$INTERNET_SERVICES+18FB0	0.2	2162.3	5390	366	776	93.6	10409	0.1
804748F4	SYS$DKDRIVER+028F4	0.1	789.8	54328	409	989	41.7	11260	0.1
8A8B8BDC	TCPIP$INTERNET_SERVICES+1ABDC	0.1	2162.3	5714	168	344	34.2	9683	0.0
800F0184	EXE$CANCEL_C+001C4	0.1	1109.4	16774	286	635	43.9	11310	0.1
8A8A6DFC	TCPIP$INTERNET_SERVICES+08DFC	0.1	152.9	17377	1545	4384	16.5	15439	0.0
8A8B678C	TCPIP$INTERNET_SERVICES+1878C	0.1	19.4	104755	2235	27485	0.6	3752	0.0
8A8A690C	TCPIP$INTERNET_SERVICES+0890C	0.1	281.3	6766	410	1609	27.4	7451	0.0
8A8A0F48	TCPIP$INTERNET_SERVICES+02F48	0.0	151.8	5139	592	2635	16.0	7704	0.0
80678C94	PEM$EXEC_TIMER_C+0002C	0.0	49.1	15964	4302	6619	2.3	11106	0.0
80101B90	ACP_STD$MOUNT_C+00B20	0.0	468.5	4320	272	681	17.7	9699	0.0
8021C730	CHECK_DISMOUNT_C+000F0	0.0	557.5	2047	286	569	22.8	13166	0.0
8041BF70	SYS$TTDRIVER+01F70	0.0	17.7	54597	1399	14268	2.3	18460	0.0
8AA809F4	ECP$DRIVER+069F4	0.0	93.0	6950	1488	2194	3.4	9300	0.0
804FC170	SHTD$INSIOQC_RETURN_C+00060	0.0	29.7	9973	477	3748	8.0	6160	0.0
80954808	SYS$LTDRIVER+0A808	0.0	4.6	11999	7023	8926	0.0	0	0.0
800FE78C	EXE_STD$QXQPPKT_C+0009C	0.0	89.0	1660	211	379	2.3	21375	0.0
8094D180	SYS$LTDRIVER+03180	0.0	9.7	25603	552	3227	1.1	7496	0.0
800FECAC	EXE_STD$INSIOQC_C+0007C	0.0	14.8	5985	466	1758	0.0	0	0.0
8006C70C	STALL_FORK_WAIT_C+0022C	0.0	1.1	12361	8862	10611	0.6	1670	0.0
8AA60BAC	TCPIP$TNDRIVER+06BAC	0.0	0.6	20694	20694	20694	0.0	0	0.0
807035D0	LES$TIMER_C+001F0	0.0	10.3	1850	627	920	0.0	0	0.0
80705734	LES$TIMER_TIMER_C+00104	0.0	10.3	1781	283	903	0.0	0	0.0
8042F10C	SYS$FGEDRIVER+0110C	0.0	1.1	8581	6090	7335	0.0	0	0.0
801D6AB4	LCK$DEQLOCK_C+005B4	0.0	0.6	14555	14555	14555	0.0	0	0.0
896AA8A0	PWIPDRIVER+048A0	0.0	5.1	2592	1012	1435	0.6	4742	0.0
800ED324	IOC_STD$SEVER_UCB_C+00074	0.0	1.1	5710	1171	3440	0.0	0	0.0
80707BC0	LES$PROCESS_TIMER_SERVICE_C+00068	0.0	11.4	598	180	334	0.0	0	0.0
80050FCC	EXE$TIMEOUT_C+0014C	0.0	6.3	2727	306	589	0.0	0	0.0
80989B54	SYS$LASTDRIVER+11B54	0.0	0.6	5340	5340	5340	0.0	0	0.0
80705468	LES$TIMER_START_C+00078	0.0	4.0	1108	441	762	0.0	0	0.0
800E74A4	IOC$LAST_CHAN_AMBX_C+00154	0.0	0.6	4962	4962	4962	0.0	0	0.0
8A8B24C8	TCPIP$INTERNET_SERVICES+144C8	0.0	1.1	3736	755	2245	0.0	0	0.0
80841FB4	TP_NSP$TIMER_C+00074	0.0	0.6	4005	4005	4005	0.0	0	0.0
80891658	OSITP$MAINTIMERROUTINE_C+00040	0.0	0.6	3657	3657	3657	0.0	0	0.0
8A8A5050	TCPIP$INTERNET_SERVICES+07050	0.0	0.6	3224	3224	3224	0.0	0	0.0
802A3130	SYSGETSYI+03130	0.0	1.7	1591	433	825	0.0	0	0.0
8005137C	EXE$TIMEOUT_C+004FC	0.0	0.6	2437	2437	2437	0.0	0	0.0
80878C40	TPCONS$MAINTIMERROUTINE_C+00050	0.0	0.6	1616	1616	1616	0.0	0	0.0
8A8A4460	TCPIP$INTERNET_SERVICES+06460	0.0	0.6	1476	1476	1476	0.0	0	0.0
8033DE00	SCS$PORT_INIT_DONE_C+00520	0.0	0.6	1236	1236	1236	0.0	0	0.0
8070781C	LES$SYSTEM_TIMER_SERVICE_C+00064	0.0	1.1	924	192	558	0.0	0	0.0
80706DC0	LES$FASTLANE_SEND_C+003E0	0.0	1.1	548	434	491	0.0	0	0.0

Spinlock Trace Information for LCKMGR:

CPU ID	% Time Held	Acquires/sec	Average Hold	% Time Spinning	Waits/sec	Average Spin	Spin to Hold Ratio
00	0.2	65.6	26614	0.0	0.0	0	0.00
01	0.4	429.1	7838	0.0	0.6	1609	0.00
02	1.4	2128.0	5386	0.0	0.6	13439	0.00
	2.0	2622.8	6318	0.0	1.1	7524	0.00

Spinlock Trace Information for LCKMGR: (11-MAY-2006 13:14:55.60, 1.2 nsec, 833 MHz)

Caller's PC		% Time Held	Acquires /sec	Maximum	Minimum	Average	Spinwaits /sec	Average Spinwait	% Time Spin
801D5400	EXE$DEQ_C+000F0	0.8	996.4	69310	510	6873	0.0	0	0.0
801D285C	LOCKING+0285C	0.6	369.2	73749	1022	13549	0.6	1609	0.0
801D1ECC	LOCKING+01ECC	0.2	652.3	11575	1161	2449	0.0	0	0.0
80358210	CNX$RCV_MSG_C+00070	0.2	249.4	88742	2667	5255	0.0	0	0.0
80377998	LCK$RRSCAN_C+00038	0.1	0.6	1853165	1853165	1853165	0.0	0	0.0
8036DF30	LCK$SND_LOCKREQ_C+00190	0.1	249.4	9315	928	1769	0.6	13439	0.0
801D09D0	EXE$ENQ_C+00900	0.0	104.4	13495	707	2642	0.0	0	0.0
801D266C	LOCKING+0266C	0.0	0.6	59067	59067	59067	0.0	0	0.0
80051354	EXE$TIMEOUT_C+004D4	0.0	0.6	4698	4698	4698	0.0	0	0.0

Spinlock Trace Information for MMG:

CPU ID	% Time Held	Acquires/sec	Average Hold	% Time Spinning	Waits/sec	Average Spin	Spin to Hold Ratio
00	0.1	400.6	2185	0.0	0.6	3270	0.00
01	0.1	394.3	2586	0.0	2.3	1825	0.00
02	0.4	1950.5	1614	0.0	2.9	3028	0.00
	0.6	2745.5	1837	0.0	5.7	2571	0.00

Spinlock Trace Information for MMG: (11-MAY-2006 13:15:00.69, 1.2 nsec, 833 MHz)

Caller's PC		% Time Held	Acquires /sec	Maximum	Minimum	Average	Spinwaits /sec	Average Spinwait	% Time Spin
80179624	MMG_STD$IOLOCK_BUF_C+00204	0.2	775.0	8790	415	1988	2.3	1751	0.0
80179EFC	MMG_STD$IOUNLOCK_BUF_C+0007C	0.2	775.0	6353	289	1751	0.6	3270	0.0
8017D210	MMG$PAGEFAULT_C+000F0	0.1	137.0	47635	658	6340	1.1	3514	0.0
8031E6DC	XFCMEMMGTUNMAPPAGES_C+000EC	0.1	29.7	29303	5543	16332	0.0	0	0.0
8017A24C	MMG$LOCK_SYSTEM_PAGES_C+0010C	0.0	276.8	7083	199	844	1.7	2801	0.0
800E3028	IOC$IOPOST_C+00A88	0.0	29.7	10724	4531	6336	0.0	0	0.0
8017A564	MMG$UNLOCK_SYSTEM_PAGES_C+000D4	0.0	275.6	2375	187	351	0.0	0	0.0
8017BA48	MMG_STD$FAULT_ON_WRITE_C+00088	0.0	46.2	7642	636	1160	0.0	0	0.0
8005E984	LDR_STD$ALLOC_S0S1_VA_C+00094	0.0	29.7	5411	480	1220	0.0	0	0.0
800698F8	MMG$PTEREF_64_C+001B8	0.0	66.8	1707	329	510	0.0	0	0.0

```
80198CB8  MMG_STD$SET_GH_AND_FASTMAP_64_C+00888        0.0       88.5       1102       179        342        0.0          0     0.0
8005F07C  LDR_STD$DEALLOC_S0S1_VA_C+0009C             0.0       29.7       4179       391       1008        0.0          0     0.0
8031E42C  XFCMEMMGTMAPPAGES_C+000EC                   0.0       29.7       1644       339        651        0.0          0     0.0
801AA424  EXE$CLONE_ADDRESS_SPACE_C+007D4             0.0       47.4       1346       180        401        0.0          0     0.0
8017B32C  MMG_STD$PT_NO_DELETE_C+0005C                0.0       46.8        605       190        337        0.0          0     0.0
80178DC0  MMG$FAULT_ON_EXECUTE_C+00080                0.0       10.8       3471       431       1336        0.0          0     0.0
80068300  MMG_STD$SUBSECREFL_C+00090                  0.0       28.5       1223       195        392        0.0          0     0.0
80196B1C  EXE$MGBLSC_C+003CC                         0.0       12.0        834       219        480        0.0          0     0.0
80195A24  SYS$VM+21A24                              0.0       10.8        501       209        327        0.0          0     0.0

Spinlock Trace Information for TIMER:

CPU ID        % Time Held   Acquires/sec   Average Hold    % Time Spinning      Waits/sec   Average Spin   Hold Ratio
------    ---------------   ------------   ------------    ---------------   ------------   ------------  -----------
    00                0.2          919.9           1940               0.0            0.0              0         0.00
    01                0.0           68.5           6071               0.0            0.6           1297         0.00
    02                0.1           70.8           6086               0.0            0.0              0         0.00
          ---------------   ------------   ------------    ---------------   ------------   ------------  -----------
                      0.3         1059.2           2484               0.0            0.6           1297         0.00

Spinlock Trace Information for TIMER: (11-MAY-2006 13:15:05.77,  1.2 nsec, 833 MHz)

                                                  % Time   Acquires                                  Spinwaits    Average  % Time
Caller's PC                                         Held      /sec     Maximum   Minimum    Average      /sec   Spinwait    Spin
--------------------------------------------------  ------  --------  ----------  --------  ---------  ---------  ---------  ------
800503BC  EXE_STD$IOFORK_CPU_C+0047C                   0.1     299.6       14733       913       2909        0.0          0     0.0
8014D9F4  EXE$SCHDWK_C+002B4                          0.1     116.4       16752      1701       5421        0.0          0     0.0
80057158  EXE$INSTIMQ_C+00068                        0.1     207.2       10248       720       2146        0.0          0     0.0
80050830  EXE$SWTIMER_FORK_C+002A0                   0.0     379.5        8693       345        941        0.0          0     0.0
8014DE24  EXE$SETIMR_C+00234                         0.0      54.8       13624      1524       5609        0.6       1297     0.0
80057420  EXE$RMVTIMQ_C+00070                        0.0       1.7       13507      9468      11048        0.0          0     0.0


Spinlock Trace Information for MAILBOX:

                                                                                                          Spin to
CPU ID        % Time Held   Acquires/sec   Average Hold    % Time Spinning      Waits/sec   Average Spin   Hold Ratio
------    ---------------   ------------   ------------    ---------------   ------------   ------------  -----------
                      0.0            0.0              0               0.0            0.0              0         0.00

Spinlock Trace Information for MAILBOX: (11-MAY-2006 13:15:10.85,  1.2 nsec, 833 MHz)

                                                  % Time   Acquires                                  Spinwaits    Average  % Time
Caller's PC                                         Held      /sec     Maximum   Minimum    Average      /sec   Spinwait    Spin
--------------------------------------------------  ------  --------  ----------  --------  ---------  ---------  ---------  ------

SPL$DEBUG unload status = 00000001
```

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STREAMS

SHOW

SHOW

Syntax : SDA> STREAMS SHOW [address]

The SHOW command displays the various fields of a
structure. The address parameter is the start address
of the structure. This parameter is required unless
a symbolic name is used

Additional information available:

```
CTXT       DBLK       DLLDEFAULTS           DLLLINK    DLLMAC     IMAGE
KNBCACHE   KNBCACHE_INFO         KNBDEFAULTS           KNBNAME
KNBSESSION MBLK       MINFO      NBDEFAULTS NBLINK     NBMAC      NBNAME
NBSESSION  QINIT      SCB        STREAMHEAD STREAMQUEUE
STREAMTRACE           TPEP       TPEPX
```

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TCPIP

The TCPIP verb prefixes all of the TCPIP (TCP/IP Services for
OpenVMS) SDA extension's commands.

Format:

```
  TCPIP [qualifiers]
  TCPIP SEARCH ...
  TCPIP SHOW ...
  TCPIP SYSCONFIG ...
  TCPIP TAG ...
```

Additional information about the TCPIP extension can be found
under the `About_TCPIP$SDA' topic.

```
  Additional information available:

  About_TCPIP$SDA       Development_Qualifiers          SEARCH     SHOW
  SYSCONFIG  TAG
```

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```
Debug Tracing Utility TR commands:
        TR LOAD
        TR UNLOAD
        TR START TRACE [/BUFFER=pages]
        TR STOP  TRACE
        TR SHOW  TRACE
```

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```
Timer Tracing Utility TQE commands:

        TQE LOAD
        TQE UNLOAD

        TQE START TRACE [/BUFFER=pages]
        TQE STOP  TRACE

        TQE SHOW  TRACE [/SUMMARY]
                        [/IDENTIFICATION=pid]
                        [/ADDRESS=address]

Example:

SDA> tqe load
TQE$DEBUG load status = 00000001
SDA> tqe start trace
Tracing started...
SDA> tqe stop trace
Tracing stopped...
SDA> tqe show trace

Timer Trace Information:
------------------------
Timestamp               CPU  Routine / PID & Process                Type  Function     R3/AST   R4/ASTPR TQEaddr  Trace Buffer
----------------------- --- ---------------------------------------- ----- ------------ -------- -------- -------- ----------------
11-MAY 12:55:42.617478  00 0001002F TDC_POLL                        TSD-- instimq      0012B950 00000009 82139680 FFFFFFFF.7C232D38
11-MAY 12:55:42.617477  00 0001002F TDC_POLL                        TSD-- tqe fire     0012B950 00000009 82139680 FFFFFFFF.7C232D00
11-MAY 12:55:42.617477  00 81A69190 NET$ROUTING_IS+1CF90            SRD-- instimq      00000000 00000000 81A5A4A8 FFFFFFFF.7C232CC8
11-MAY 12:55:42.617476  00 81A69190 NET$ROUTING_IS+1CF90            SRD-- tqe fire     00000000 00000000 81A5A4A8 FFFFFFFF.7C232C90
11-MAY 12:55:42.617475  00 81A03AC0 SYS$PEDRIVER+342C0              SRD-- instimq      81D3A5C0 81D3AE30 81A06A48 FFFFFFFF.7C232C58
11-MAY 12:55:42.617475  00 81A03AC0 SYS$PEDRIVER+342C0              SRD-- tqe fire     81D3A5C0 81D3AE30 81A06A48 FFFFFFFF.7C232C20
11-MAY 12:55:42.617475  00 0001002F TDC_POLL                        TSD-- instimq      0012B828 0000000B 821392C0 FFFFFFFF.7C232BE8
11-MAY 12:55:42.617475  00 0001002F TDC_POLL                        TSD-- tqe fire     0012B828 0000000B 821392C0 FFFFFFFF.7C232BB0
11-MAY 12:55:42.617474  00 81A69190 NET$ROUTING_IS+1CF90            SRD-- instimq      00000000 00000000 81A5A4A8 FFFFFFFF.7C232B78
11-MAY 12:55:42.617474  00 81A69190 NET$ROUTING_IS+1CF90            SRD-- tqe fire     00000000 00000000 81A5A4A8 FFFFFFFF.7C232B40
11-MAY 12:55:42.617474  00 0001002F TDC_POLL                        TSD-- instimq      0012B950 00000009 82139680 FFFFFFFF.7C232B08
11-MAY 12:55:42.617473  00 0001002F TDC_POLL                        TSD-- tqe fire     0012B950 00000009 82139680 FFFFFFFF.7C232AD0
11-MAY 12:55:42.617472  00 81A69190 NET$ROUTING_IS+1CF90            SRD-- instimq      00000000 00000000 81A5A4A8 FFFFFFFF.7C232A98
11-MAY 12:55:42.617472  00 81A69190 NET$ROUTING_IS+1CF90            SRD-- tqe fire     00000000 00000000 81A5A4A8 FFFFFFFF.7C232A60
11-MAY 12:55:42.617471  00 81A03AC0 SYS$PEDRIVER+342C0              SRD-- instimq      81D3A5C0 81D3AE30 81A06A48 FFFFFFFF.7C232A28
11-MAY 12:55:42.617471  00 81A03AC0 SYS$PEDRIVER+342C0              SRD-- tqe fire     81D3A5C0 81D3AE30 81A06A48 FFFFFFFF.7C2329F0
11-MAY 12:55:42.617471  00 0001002F TDC_POLL                        TSD-- instimq      0012B828 0000000B 821392C0 FFFFFFFF.7C2329B8

    Press RETURN for more.
SDA> tqe unload
TQE$DEBUG unload status = 00000001
```

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```
The USB display utility supports the following commands:

CLS                     - Clear display
Set controller ddcu     - Select USB controller ddcu
Show bus                - Show the bus data structure
Show device address     - Show device data structure at supplied address
Show device trace       - Show trace of where device has been
Show endpoint address   - Show USB endpoint data strucutre at supplied address
Show interface address - Show USB interface data strucutre at supplied address
Show hid collection addr - Show HID collection data structure at supplied
                           address
Show hid context addr   - Show hid context data structure
Show hid item address   - Show hid item data structure at supplied address
Show hid main address   - Show hid main item data structure at supplied address
Show hub address        - Show hub data structure at supplied address
show ohci bulk          - Show OHCI controllers bulk Endpoint
Show ohci control       - Show OHCI controllers control Endpoint
Show ohci edlist x      - Show OHCI endpoint list head entry x is address of
                          list entry
Show ohci endpoint x    - Show OHCI endpoint list head where x is 1-63 or A
                          for all
Show ohci hcca          - Show OHCI Host Controler Communications Area
Show ohci hcded addr    - Show OHCI whole endpoint descriptor
Show ohci hcdtd addr    - Show OHCI whole transmit descriptor
Show ohci Interrupt x   - Show OHCI interrupt list head for 1, 2, 4, 8, 16,
```

```
                                32 or All service intervals
Show ohci registers    - Show OHCI device registers
Show ohci ucb          - Show OHCI UCB extensions
Show pipe address      - Show USB pipe data strucutre at supplied address
Show request address   - Show USB reqest data structure at supplied address
Show request trace     - Show trace of where request has been
Show root              - Show root hub data structure
Show topology          - Show address and tier of all devices on the bus
Spawn                  - Exit to DCL prompt
```

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```
%CLI-W-SYNTAX, error parsing 'X25'
```

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```
SDA> XFC HELP

HELP


     The SDA extension commands for eXtended File Cache (XFC) enable you
     to perform the following tasks:

        . Display, in a convenient and readable format, various XFC
          data structures

        . Display, in a convenient and readable format, statistics
          that aid in tuning the extended file cache

        . Control the types of events that are recorded by XFC's
          tracing feature.


  Additional information available:

  EXIT       HELP       LOAD       QUIT       SET        SHOW

SDA> xfc help show

SHOW


     Displays information contained in various internal XFC data structures.


  Additional information available:

  CONTEXT    EXTENT     FILE       HISTORY    IRP        MEMORY     SUMMARY
  TABLES     TRACE      VOLUME


Examples:

SDA> xfc sho volu/br

Summary of XFC Cached Volumes (CVBs)
------------------------------------
Volume Name       CVB                Open    Closed      Total       Read       Read      Write      ... Response (Milliseconds)...
                                    Files     Files       I/Os       Hits      Count      Count         Hits       disk    Average
DISK$BACKUP       FFFFFFFF40188A00       0         0          3          1          2          1       0.0344    13.4109     8.9520
DISK$TOOLS        FFFFFFFF401887A0       0         2       7061        236       2788       4273       0.1285    29.4148    28.4360
DISK$USER1        FFFFFFFF40188540       0        30     195192       9880     116912      77133       0.0702    14.8034    14.1407
DISK$I64SYSBCK    FFFFFFFF401882E0       0         0    1485041       9581      21960    1463081       0.0292     0.0636     0.0634
DISK$I64V82SYS    FFFFFFFF40188080     444       487   33703546   24949702   26878329    6825217       0.0539     4.3322     1.1651

Volumes found: 5

SDA> xfc sho file/cvb=FFFFFFFF40188080/br

Brief XFC Cache File Block (CFB) Listing
----------------------------------------
{CVB: FFFFFFFF40188080 | Volume: DISK$I64V82SYS}

CFB Address      File Name / File ID                                    Access  Write      Total      Read     Hit   Extent Allocated
                                                                         Count  Access      I/Os      Hits    Rate    Count      Pages
FFFFFFFF7D427940 [SYS0.TCPIP$NTP]TCPIP$NTP.DRIFT;7781                       0       0         2         0   0.00%        1          1
FFFFFFFF7D425700 [SAMBA.VAR.LOCKS]BROWSE.DAT;1                              0       0         2         0   0.00%        1          1
FFFFFFFF7D41B940 [VMS$COMMON.SYSHLP]XFC$SDA.HLB;1                           0       0        21        12  57.14%        3          3
FFFFFFFF7D41A740 [VMS$COMMON.SYSLIB]XFC$SDA.EXE;1                           1       0        82        54  65.85%       62         62
FFFFFFFF7D426980 [VMS$COMMON.SYSHLP]TCPIP$SDA.HLB;1                         0       0         3         0   0.00%        5          5
FFFFFFFF7D426500 [VMS$COMMON.SYSEXE]TCPIP$PROXY_SERVICES.STB;1              0       0         5         3  60.00%        3          3
FFFFFFFF7D4262C0 [VMS$COMMON.SYSEXE]TCPIP$PROXY_GLOBALS.STB;1               0       0         7         6  85.71%        2          2
FFFFFFFF7D426080 [VMS$COMMON.SYSEXE]TCPIP$TNDRIVER.STB;1                    0       0         5         4  80.00%        1          1
FFFFFFFF7D425040 [VMS$COMMON.SYSEXE]TCPIP$TN_GLOBALS.STB;1                  0       0        20        16  80.00%        5          5
FFFFFFFF7D425280 [VMS$COMMON.SYSEXE]TCPIP$INETACP.STB;1                     0       0         7         2  28.57%       14         14
FFFFFFFF7D425B80 [VMS$COMMON.SYSEXE]TCPIP$BGDRIVER.STB;1                    0       0         5         4  80.00%        1          1
FFFFFFFF7D4254C0 [VMS$COMMON.SYSEXE]TCPIP$INTERNET_SERVICES.STB;1           0       0         7         2  28.57%       13         13
FFFFFFFF7D424500 [VMS$COMMON.SYSEXE]TCPIP$NET_GLOBALS.STB;1                 0       0        27         2   7.41%       90         90
    Press RETURN for more.
SDA>

SDA> xfc show memory/brief
```

```
XFC Memory Summary
------------------
Boottime Maximum Cache Size      :    536674304 (  511.8 MB)
Current Maximum Cache Size       :    536674304 (  511.8 MB)
Total Allocated Cache Memory     :    273609984 (  260.9 MB)  Peak:    412854400 (  393.7 MB)
Minimum cache size               :     10731520 (   10.2 MB)

Permanent Data Pages: Allocated :      200
                      In use    :      200
          Pool Pages: Allocated :      200
                      In use    :      200

Dynamic Pages: Max Allowed      :    65044
               Allocated        :    32701
               In use           :    32686
   Data Pages: Allowed          :    61792
               In use           :    31863
   Pool Pages: Allowed          :     3252
               In use           :      823
                  PFN List      :      734
                  Non PFN List  :       89

    Press RETURN for more.
SDA>


SDA> xfc show histo

XFC Performance History
-----------------------
    Time             Reads     Read   Writes  .Cached Files. Files  ..Blk ASTs. ...Memory trim..... LRU    ....Memory (pages).....
                               Hits           Open  Closed Opened  File Volume Requests  Requeues  Cycle  Reclaim Expand Allocated
Current                1066     1025      354    444     519      4     0      0         0         0      0         0      80     32685
13-MAY 14:03:16.45     1081     1071      771    441     520      3     0      0         0         0      0         0      32     32605
13-MAY 13:43:16.45     1087     1082      771    441     519      3     0      0         0         0      0         0      16     32573
13-MAY 13:23:16.45     1098     1092      778    441     519      4     0      0         0         0      0         0      16     32557
13-MAY 13:03:16.45     1428     1412      766    441     519     16     0      0         0         0      0         0      16     32541
13-MAY 12:43:16.45     1091     1086      776    441     519      3     0      0         0         0      0         0      16     32525
13-MAY 12:23:16.45     1262     1255      779    441     519      9     0      0         0         0      0         0       0     32509
13-MAY 12:03:16.45     2235     2012      779    441     522     72     0      0         0         0      0         0    1376     32509
13-MAY 11:43:16.44     2784     2242      839    443     460     90     0      0         0         0      0         0    1696     31133
13-MAY 11:23:16.44     1098     1092      776    441     445      4     0      0         0         0      0         0       0     29437
13-MAY 11:03:16.44     1478     1462      781    441     445     16     0      0         0         0      0         0       0     29437
13-MAY 10:43:16.44     1113     1101      777    441     445      5     1      0         0         0      0         0       0     29437
13-MAY 10:23:16.44     1122     1107      787    441     444      7     1      0         0         0      0         0       0     29437
13-MAY 10:03:16.44     1066     1062      765    441     442      2     0      0         0         0      0         0       0     29437
13-MAY 09:43:16.44     1087     1082      771    441     442      3     0      0         0         0      0         0       0     29437
13-MAY 09:23:16.44     1103     1096      778    441     442      5     0      0         0         0      0         0       0     29437
13-MAY 09:03:16.44     1519     1503      781    441     441     16     0      0         0         0      0         0       0     29437
...
```

```
PWAIT$SDA - Freeware SDA Extension to analyze waiting process

Examples:

OPERCRASH, Operator forced system crash

SDA> show summ

Current process summary
-----------------------
 Extended Indx Process name    Username    State   Pri PCB/KTB    PHD    Wkset
-- PID -- ---- --------------- ----------- ------- --- -------- -------- ------
 20400401 0001 SWAPPER         SYSTEM       HIB     16 A0271938 A0270C00      0
 20400407 0007 CLUSTER_SERVER  SYSTEM       HIB     13 8829DB00 A14B6000    276
 20400408 0008 CONFIGURE       SYSTEM       HIB      8 8818C700 A14AE000     93
 20400409 0009 USB$UCM_SERVER  SYSTEM       HIB      6 88673600 A14BA000    416
 2040040A 000A LANACP          SYSTEM       HIB     14 88625C40 A14BE000    301
 2040040C 000C FASTPATH_SERVER SYSTEM       HIB     10 886E2D00 A14C6000    222
 2040040D 000D IPCACP          SYSTEM       HIB     10 886E4540 A14CA000    126
 2040040E 000E ERRFMT          SYSTEM       FPG      9 886E7480 A14CE000    308
...
SDA> set proc/ind=0e
SDA> pwait
PWAIT V0.F (c) 2004, Ian Miller (miller@encompasserve.org) built on VMS V8.2
Process PID 2040040E name ERRFMT No. Threads 1
Thread 0: state FPG AST pending K active K blocked (none)
Process has been waiting for 03:52:52.69
Process thread resource wait is ENABLED
Analyzing process locks PCB$Q_LOCKQFL = FFFFFFFF.886E7828 FFFFFFFF.886E7828
Process owns no locks
===================== PWAIT$SDA Analysis ==============================
Process in FPG - Free PaGe wait state
Examine SCH$GL_FREECNT on Alpha, SCH$GI_FREECNT on I64
If FREECNT > 0, then look at exceeding lockidtbl
Free page count 0001FDD7
LCK$GL_IDTBLMAX:  00000000.003C857B   "{.<....."
LCK$GL_LCKCNT:  00000000.003C8609   "..<....."
LCK$GL_LKIDCNT:  00000000.003C8800   "..<....."
LCK$GL_LKIDFREE:  00000000.00000000   "........"



CPUSPINWAIT, CPU spinwait timer expired

SDA> sho summ

Current process summary
-----------------------
```

```
 Extended Indx Process name    Username    State   Pri PCB/KTB    PHD    Wkset
-- PID -- ---- --------------- ----------- ------- --- -------- -------- ------
 22600201 0001 SWAPPER         SYSTEM       HIB     16 A3271938 A3270C00      0
 2260020E 000E ERRFMT          SYSTEM       RWSCS    7 8877CFC0 A42CE000    146
...
 226010C6 00C6 T4226010BB_TCP  SYSTEM       MUTEX   15 8A228D00 A435A000    129
...
 22600F1A 011A MYSQL_SERVER    MYSQL_SERVER INNER    6 89F43980 A441A000    374
...
SDA> set proc/ind=e
SDA> pwait
PWAIT V0.F (c) 2004, Ian Miller (miller@encompasserve.org) built on VMS V8.2
Process PID 2260020E name ERRFMT No. Threads 1
Thread 0: state MWAIT AST pending (none) active K blocked (none)
Process has been waiting for 00:00:38.34
Process thread resource wait is ENABLED
Analyzing process locks PCB$Q_LOCKQFL = FFFFFFFE.99474230 FFFFFFFE.99474230
Process owns 1 locks - none waiting or converting
RWSCS - waiting for System Communication Services
check cluster connections
SDA> sho conn

VMScluster data structures
--------------------------

                  --- CDT Summary Page ---

CDT Address   Local Process     Connection ID     State       Remote Node
-----------   -------------     -------------     -----       -----------
 ...
 88634800     VMS$DISK_CL_DRVR    68A20006        vc_fail      NODE2
 88635AC0     SCA$TRANSPORT       68D40007        open         NODE2
 8870EB00     VMS$VAXcluster      68660008        open         NODE2
 88712540     MSCP$DISK           68660009        open         NODE2

Number of free CDTs:  1


SDA> pwait
PWAIT V0.F (c) 2004, Ian Miller (miller@encompasserve.org) built on VMS V8.2
Process PID 226010C6 name T4226010BB_TCP No. Threads 1
Thread 0: state MWAIT AST pending S active U blocked (none)
Process has been waiting for 00:00:01.82
Process thread resource wait is ENABLED
Analyzing process locks PCB$Q_LOCKQFL = FFFFFFFF.8A2290A8 FFFFFFFF.8A2290A8
Process owns no locks
        waiting for mutex 8ABA2000

SDA> pwait
PWAIT V0.F (c) 2004, Ian Miller (miller@encompasserve.org) built on VMS V8.2
Process PID 22600F1A name MYSQL_SERVER No. Threads 2
Thread 0: state MWAIT AST pending (none) active S blocked (none)
Process has been waiting for 00:01:20.34
Process thread resource wait is ENABLED
Analyzing process locks PCB$Q_LOCKQFL = FFFFFFFE.3A518AF0 FFFFFFFE.3A518AF0
Process owns 1 locks - none waiting or converting
RWINS - waiting for Inner mode access for Kthreads

Process index: 011A   Name: MYSQL_SERVER      Extended PID: 22600F1A
------------------------------------------------------------------------
Inner Mode Semaphore Address:   FFFFFFFE.402D0000
Owner:                                    0008
Ownership Depth:                          0004
Tolerant count:                           0000
Flags:                                    0015
History Buffer Index:                       0F

History Buffer: (most recent to oldest)

        Semaphore    PC/Service/Event
        ---------    ----------------
        00080004     02001417   SYS$$ENQ
        00080003     8074FB00   SYS$ENQ_C+00140
        00080004     02001417   SYS$$ENQ
        00080002     80B3F4C0   NSA$GET_PSB_C+002A0
        00080003     010001CD   SYS$PERSONA_EXTENSION_LOOKUP
        00080002     02001420   SYS$$QIO
        00080001     801B9AD0   AMAC$EMUL_CALL_NATIVE_64_C+001E0
        ...
Thread 1: state MWAIT AST pending U active K blocked (none)
Process has been waiting for 00:02:18.35
Process thread resource wait is ENABLED
RWSCS - waiting for System Communication Services
check cluster connections
SDA>


SDA> set proc queue_manager
SDA> pwait
PWAIT V0.F (c) 2004, Ian Miller (miller@encompasserve.org) built on VMS V8.2
Process PID 2260044D name QUEUE_MANAGER No. Threads 1
Thread 0: state HIB AST pending (none) active (none) blocked (none)
Process has been waiting for 00:02:24.89
Process thread resource wait is ENABLED
Analyzing process locks PCB$Q_LOCKQFL = FFFFFFFE.3CA17B30 FFFFFFFF.6DAC89B0
waiting lock LKB= FFFFFFFE.9EC4C440
Process locks waiting/converting/total: 1/0/19)
process has 12 channels 0 of which are busy
    Press RETURN for more.
SDA>

Process index: 004D   Name: QUEUE_MANAGER     Extended PID: 2260044D
```

```
------------------------------------------------------------------------

                          Timer queue entries
                          -------------------


TQE address:                      921D1A80   Type:                    00000008
TIMER ABSOLUTE
    Requestor process ID:         0002004D   Access mode:             00000043

    Expiration time:     00A51BF2.04CC73A0   23-FEB-2006 11:09:03.38  +01632

    EFN:                          00000000   AST address:             001117B0 QMAN$QUEUE_MANAGER+001117B0
                                             AST parameter:           00000001

SDA>
SDA> sho lock/addr=FFFFFFFE.9EC4C440

Lock Database
-------------

Lock id:  05413922            PID:    0002004D   Flags: NODLCKW
Par. id:  0A7B8484            SUBLCKs:       0
LKB:      FFFFFFFE.9EC4C440   BLKAST: 00000000
Priority:     0000            RQSEQNM:     0000

Waiting for   CR   00000000-FFFFFFFF

RSB:               FFFFFFFE.9E9F5840
Resource:          43424A24 4E414D51  QMAN$JBC  Status: ASYNC   VALBLKR VALBLKW
 Length   17       305F4556 494C415F  _ALIVE_0
 User mode         00000000 00000031  1.......
 Group   001       00000000 00000000  ........

Local copy

SDA> sho res/lock=05413922

Resource Database
-----------------
RSB:          FFFFFFFE.9E9F5840  GGMODE:     EX  Status: VALID   WTFULRG XVALID
Parent RSB:   FFFFFFFE.7B0C9340  CGMODE:     EX
Sub-RSB count:      0            FGMODE:     EX
Lock Count:         2            RQSEQNM:  0001
BLKAST count:       0            CSID: 00000000  (NODE1)

Resource:          43424A24 4E414D51  QMAN$JBC  Valblk: 00000000 00000000
 Length   17       305F4556 494C415F  _ALIVE_0          00000000 00000000
 User mode         00000000 00000031  1.......          ................
 Group   001       00000000 00000000  ........  Seqnum: 00000000

Granted queue (Lock ID / Gr mode / Range):
 0F409821  EX 00000000-FFFFFFFF

Conversion queue (Lock ID / Gr mode / Range -> Rq mode / Range):
     *** EMPTY QUEUE ***

Waiting queue (Lock ID / Rq mode / Range):
 05413922  CR 00000000-FFFFFFFF
```

```
PROCIO - SDA Extension to show process file IO counters

Examples:

SDA> set proc job_control       ! from the running system ( $ ANAL/SYS )
SDA> procio

      reads    writes  file         - Process PCB: 88478740
-----------------------------------------------------------------
          1      4474  DISK$I64V82SYS:[SYS0.SYSMGR]ACCOUNTNG.DAT;1
          9         1  DISK$I64V82SYS:[VMS$COMMON.SYSEXE]QMAN$MASTER.DAT;1

SDA> set proc job_control       ! in a system dump ( $ ANAL/CRASH )
SDA> procio

      reads    writes  file         - Process PCB: 886F1900
-----------------------------------------------------------------
          1      3389  $1$DGA1:(8494,1,0)            FCB: 886EDF80
          9         1  $1$DGA1:(9250,9,0)            FCB: 886F4080
Use CLUE XQP/FILE=fcb_address for more information about file
```

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SDA Extensions found on OpenVMS Alpha/I64 system disks in SYS$SHARE:

```
V6.2            CLUE$SDA

V7.1-2          CLUE$SDA

V7.2-1          CLUE$SDA
                DECDTM$SDA
                FC$SDA
```

	FORMS$SDA
	IPC$SDA
	PTHREAD$SDA
	PWIP$SDA
	TCPIP$SDA
V7.2-1H1	CLUE$SDA
	DECDTM$SDA
	FC$SDA
	IPC$SDA
	LCK$SDA
	PTHREAD$SDA
	PWIP$SDA
	SPL$SDA
	TCPIP$SDA
V7.2-2	CLUE$SDA
	CNX$SDA
	DECDTM$SDA
	FC$SDA
	IPC$SDA
	LAN$SDA
	LCK$SDA
	PTHREAD$SDA
	PWIP$SDA
	SPL$SDA
	TCPIP$SDA
V7.3	CLUE$SDA
	CNX$SDA
	DECDTM$SDA
	FC$SDA
	IPC$SDA
	LAN$SDA
	LCK$SDA
	PE$SDA
	PTHREAD$SDA
	PWIP$SDA
	SPL$SDA
	TCPIP$SDA
	XFC$SDA
V7.3-1	AS$SDA
	CLUE$SDA
	CNX$SDA
	CS$SDA
	DECDTM$SDA
	DKLOG$SDA
	FC$SDA
	IPC$SDA
	LAN$SDA
	LCK$SDA
	LES$SDA
	LNM$SDA
	MTX$SDA
	NET$SDA
	NTDS$SDA
	PE$SDA
	PTHREAD$SDA
	PWIP$SDA
	PWRK$SDA
	SPL$SDA
	STREAMS$SDA
	TCPIP$SDA
	TQE$SDA
	TR$SDA
	USB$SDA
	X25$SDA
	XFC$SDA
V7.3-2	AS$SDA
	CLUE$SDA
	CNX$SDA
	CS$SDA
	DECDTM$SDA
	DKLOG$SDA
	FC$SDA
	IO$SDA
	IPC$SDA
	LAN$SDA
	LCK$SDA
	LES$SDA
	LNM$SDA
	MTX$SDA
	NET$SDA
	NTDS$SDA
	OCLA$SDA
	PCS$SDA
	PE$SDA
	PTHREAD$SDA
	PWIP$SDA
	PWRK$SDA
	SPL$SDA
	STREAMS$SDA
	TCPIP$SDA
	TQE$SDA
	TR$SDA
	USB$SDA
	X25$SDA
	XFC$SDA
V8.2 Alpha	AS$SDA

```
                CLUE$SDA
                CNX$SDA
                CS$SDA
                DECDTM$SDA
                DKLOG$SDA
                EXC$SDA
                FC$SDA
                FLT$SDA
                IO$SDA
                IPC$SDA
                LAN$SDA
                LCK$SDA
                LES$SDA
                LNM$SDA
                MTX$SDA
                NET$SDA
                OCLA$SDA
                PCS$SDA
                PE$SDA
                PKM$SDA
                PTHREAD$SDA
                PWIP$SDA
                PWRK$SDA
                SHAD$SDA
                SPL$SDA
                STREAMS$SDA
                TCPIP$SDA
                TQE$SDA
                TR$SDA
                USB$SDA
                XFC$SDA

V8.2 I64        CLUE$SDA
                CNX$SDA
                DECDTM$SDA
                DKLOG$SDA
                EXC$SDA
                FC$SDA
                FLT$SDA
                IO$SDA
                IPC$SDA
                LAN$SDA
                LCK$SDA
                LNM$SDA
                MTX$SDA
                PCS$SDA
                PE$SDA
                PKM$SDA
                PRF$SDA
                PTHREAD$SDA
                PWIP$SDA
                SHAD$SDA
                SPL$SDA
                TCPIP$SDA
                TQE$SDA
                TR$SDA
                USB$SDA
                XFC$SDA


SDA Extension DEBUG Execlets (OpenVMS Alpha V8.2)

$ dir sys$loadable_images:*$debug.exe/col=1

Directory SYS$COMMON:[SYS$LDR]

CNX$DEBUG.EXE;1
EXC$DEBUG.EXE;1
FLT$DEBUG.EXE;1
IO$DEBUG.EXE;1
LCK$DEBUG.EXE;1
LNM$DEBUG.EXE;1
MTX$DEBUG.EXE;1
PCS$DEBUG.EXE;1
SPL$DEBUG.EXE;1
TQE$DEBUG.EXE;1
TR$DEBUG.EXE;1
```

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