z/VSE Hints & Tips

zDG06

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Agenda

- Internal Attention Routine commands
- Turbo Dispatcher
- CICS/VSE – CICS TS
- VSAM Migration to z/VSE 4.3

- *Internal Attention Routine Commands**
- Turbo Dispatcher
- CICS/VSE – CICS TS
- VSAM Migration to z/VSE 4.3

* Internal Attention Routine commands/parameters and output may change dependent on system requirements. The output can not be considered as an interface.

DEBUG – to trace system events

- Useful for problem determination
  - In some cases mandatory to identify a problem
- DEBUG facility writes system information into DEBUG areas
  - 3 DEBUG areas are allocated in SVA(31 bit) storage
  - DEBUG facility switches to next DEBUG area during abnormal task termination
- DEBUG hooks (mainly in Supervisor) generate the system information
- DEBUG
  - uses DEBUG areas in wrap around mode
  - overhead depends on workload
  - performs additional consistency checks
- Activate DEBUG, whenever you assume a system failure
- DEBUG command syntax described in Supervisor Diagnosis Reference Manual (DRM)
  - Ibm.com/vse/documentation

DEBUG – to trace system events

- DEBUG command
  - DEBUG ON,[nnnk] - activate tracing, “nnk” DEBUG area size
  - DUBUG OFF - stop DEBUG trace temporarily
  - DEBUG END - stop tracing and free allocated areas
  - DEBUG - query tracing status
  - DEBUG TRACE=REGS,TASK
    - activate register and task entry trace
  - DEBUG TRACE=NOINT,NOSIO
    - deactivate interrupt and start I/O trace
  - DEBUG TRACE=ALL,NOSVC
    - activate all traces, except SVC trace
  - DEBUG TRACE=NONE,DISP
    - deactivate all traces, but activate dispatcher trace
  - DEBUG pid - activate tracing for specific partitions (pid = SYSLOG is)
  - DEBUG SHOW[,e]
    - display DEBUG entries, e = event entry
      Attention ! may flood the console

DEBUG – to trace system events …

- DEBUG trace entries
  - Layout may change between releases dependent on system requirements
  - Trace entry events
    - Program check (EEEE00IC – IC = interruption code)
    - Display registers (EEEE0200)
    - Dispatcher exit (EEE0300)
    - I/O interrupt (EEEE0400)
    - I/O (EEEE0500)
    - External interrupt (EEEE0600)
    - Dispatcher entry (EEEE0700)
    - Supervisor call (EEEE0800)
    - Task cancel (EEEE0900)
    - Swap debug area (EEEE0A00)
    - Display data (EEEE0B00)
    - Monitor call (EEEE0Fnn – nn = monitor call class)

DEBUG – to trace system events …

- Switch DEBUG OFF before DEBUG SHOW
- DUMP DEBUG,cuu to print the current DEBUG area

```
debug
AR 0015 DEBUG OFF
AR 0015 TRACE=PCK,TEST,REGS,TASK,INT,SIO,EXT,DISP,SVC,TERM,SWCH,DATA,USER
AR 0015 TRACE=TDTR
```

```
debug show
AR 0015 DISP                                          TIME=13:41:12.785304 GMT

                PSW=04000000 80086F90  TID=0020  RID=14  TDST=80  CPU=0000
               LTID=0000   PID=AR----            A(TIB)=00062580
               RTID=0020   PIK=0000  HOLD=0000   A(SCB)=00000000
               PCEF=0000  DLAY=00    TIBF=40010000 CNCL=000000
AR 0015 REGS                                          TIME=13:41:12.785305 GMT

                PSW=04002000 000167BA  TID=0020  RID=14  TDST=80  CPU=0000
                REG  0 = C5E7E3F0  400169DC  00069888  0008D420
                REG  4 = 0008BF80  000601C0  00015970  0004CC40
                REG  8 = 00062580  0004CCC0  00069618  00015150
                REG 12 = 00002000  80083918  8001598E  00016798
AR 0015 DISP                                          TIME=13:41:12.785305 GMT

                PSW=04000000 80086F90  TID=0020  RID=14  TDST=80  CPU=0000
```

DEBUG STOP – compares and stops

- Compares given data at the DEBUG event and stops, if data matches
  - System enters hardwait state (PSW = …. 0000EEEE)
  - Use restart feature or SYSTEM RESTART (on z/VM)
  - Operands are equal (EQ), not equal (NE), low (LO), high (HI)
- Be careful when using DEBUG STOP, you may see time-outs after restart

```
 debug stop,4b504,4,EQ,FE12ABCD
 AR 0015 1I40I  READY
```

```
debug stop,F4,5ac00c.1,ne,00,or,180.4,hi,0004abc0
AR 0015 1I40I  READY
```

```
debug stop,F4,5ac00c.1,ne,00,and,180.4,hi,0004abc0
AR 0015 1I40I  READY
```

```
debug stop,47b.1,eq,21
AR 0015 1I40I  READY
```

```
d pswg
PSW = 00020000 80000000 00000000 0000EEEE
```

GETVIS - retrieve partition and system GETVIS information

- Use the GETVIS command e.g. to identify
  - – areas of GETVIS shortage or
  - – the subpool, where the GETVIS space wasn't freed
- Command described in "System Control Statements
- Example
  - – GETVIS SVA shows shortage on SVA(24 bit) storage
    - If VTAM buffers are allocated in SVA(24 bit)
      - Move them into SVA(31 bit) - set the VTAM startup parameter
    - If the SVA (31 bit) is short on storage too, Increase the SVA(31 bit)

```
getvis sva,all
AR 0015 GETVIS USAGE    SVA-24     SVA-ANY                        SVA-24     SVA-ANY
AR 0015  AREA SIZE:     1,900K     34,256K
AR 0015  USED AREA:       796K     10,684K MAX. EVER USED:          828K     15,836K
AR 0015  FREE AREA:     1,104K     23,572K LARGEST FREE:          1,100K     17,348K
AR 0015 SUMMARY REPORT
AR 0015 SUBPOOL         REQUEST   <--SVA-24-AREA---     --SVA-ANY-AREA-->
AR 0015 Default                                 288K                   176K
AR 0015 IJBMCB                                  60K                     0K
AR 0015 ISTSVF                                  52K                   312K
AR 0015 IPWPWR                                  36K                     0K
AR 0015 IJBFF300A0      SPACE                   24K                     0K
AR 0015 IPTIB                                   20K                    52K
AR 0015 INLSLD                                  20K                     0K
AR 0015 IINIT                                   16K                    96K
AR 0015 IJBHCF                                  12K                     0K
AR 0015 IJBFF200B0      SPACE                    8K                     0K
AR 0015 ISTSVP                                   8K                   276K
```

SIR – System Information Report

- Provides status information and monitoring capabilities
- Can help to identify
  - Latest service level
  - Processor configuration
  - system bottlenecks (resource shortage)
  - …

```
sir ?
AR 0015        SIR COMMAND HELP
AR 0015  SIR  (<RESET|SYS>)            RESET/DISPLAY SYSTEM INFORMATION
AR 0015  SIR  SMF((,VSE)=<ON|OFF|cuu>) SUBSYSTEM MEASUREMENT DATA
AR 0015  SIR  MON(=<<id|ON(,NOSYM)>|OFF>(option)) MONITORING DATA
AR 0015  SIR  MIH((,CUU)=<NNNNNN|ON|OFF>) DSPLY/ALTER MIH
AR 0015  SIR  VTAPEBUF(=<nnnK|nnM>)  DISPLAY/ALTER VTAPE BUF-SIZE
AR 0015  SIR  LIBR                   DISPLAY LIBRARIAN INFORMATION
AR 0015  SIR  CHPID(=chpid)          DISPLAY CHPID INFORMATION
AR 0015  SIR  VENDOR                 DISPLAY VENDOR PRODUCT INF
AR 0015  SIR  CRWMSG(=<ON|OFF>)      DSPLY/ALTER CRW MSG-REPORTING
AR 0015  SIR  VMCF(=<ON|OFF>)        DSPLY/ALTER VMCF INTERFACE
AR 0015  SIR  PMRMON(=<ON|OFF>)      PAGE MANAGER MONITORING DATA
AR 0015 1I40I  READY
```

SIR – System Information Report

```
sir
AR 0015 CPUID      = 00310B8220978000
AR 0015 PROCESSOR  = IBM 2097-722 51 (70B8251)  LPAR = ECL2LP46  No. = 0049
AR 0015       CPUs = 0003 (Ded.=0000 Shr.=0003) Cap. =  13%
AR 0015 VM-SYSTEM  =                  (0000)   USERID =          VMCF = OFF
AR 0015       CPUs = 0000                       Cap. =  00%
AR 0015 PROC-MODE  = z/Arch(64-BIT)   IPL(46D)     11:41:58       09/23/2011
AR 0015 SYSTEM     = z/VSE            5.1.0 DR10                  08/25/2011
AR 0015              VSE/AF           9.1.0        FIXTRP23       09/05/2011
AR 0015              VSE/POWER        9.1.0        GA-LEVEL       08/18/2011
AR 0015 IPL-PROC   = $IPLESY          JCL-PROC   = $$JCL
AR 0015 SUPVR      = $$A$S923         TURBO-DISPATCHER (81) ACTIVE
AR 0015                               HARDWARE COMPRESSION ENABLED
AR 0015 SEC. MGR.  = BASIC            SECURITY   = ONLINE and BATCH
AR 0015 CPU-ADDR.  = 0000(IPL)    ACTIVE
AR 0015    ACTIVE  = 0000:13:45.997    WAIT = 0001:16:03.329
AR 0015    PARALLEL= 0000:00:25.160    SPIN = 0000:00:00.049
AR 0015 CPU-ADDR.  = 0001         ACTIVE
AR 0015    ACTIVE  = 0000:12:45.082    WAIT = 0001:17:19.664
AR 0015    PARALLEL= 0000:00:09.630    SPIN = 0000:00:00.039
AR 0015 CPU-ADDR.  = 0002         ACTIVE
AR 0015    ACTIVE  = 0000:09:30.091    WAIT = 0001:21:13.806
AR 0015    PARALLEL= 0000:00:04.673    SPIN = 0000:00:01.497
AR 0015 CPU timings MEASUREMENT INTERVAL    0001:31:51.483
AR 0015 TASKS ATT.= 00024             HIGH-MARK = 00025     MAX = 00352
AR 0015 DYN.PARTS  = 00000            HIGH-MARK = 00007     MAX = 00116
AR 0015
AR 0015 COPY-BLKS  = 00023            HIGH-MARK = 00053     MAX = 01539
AR 0015 CHANQ USED= 00008             HIGH-MARK = 00014     MAX = 00176
AR 0015 LBL.-SEGM.= 00008             HIGH-MARK = 00012     MAX = 00717
AR 0015 PGIN  TOT.= 0000004367        EXP.AVRGE.= 0000000016/SEC
AR 0015 PGOUT TOT.= 0005292914
AR 0015       UNC.= 0001843012        EXP.AVRGE.= 0000000508/SEC
AR 0015       PRE = 0003449902        EXP.AVRGE.= 0000000056/SEC
AR 0015 LOCKS EXT.= 0000002878        LOCKS INT.= 0000010569
AR 0015      FAIL = 0000000177             FAIL = 0000000020
AR 0015 LOCK I/O   = 0000000000       LOCK WRITE= 0000000000
AR 0015 1I40I  READY
```

SIR – System Information Report

- SIR SMF

```
sir smf
AR 0015 DEVICE   I/O-CNT      QUEUED       CONNECT      DISCONN      TOTAL
AR 0015                     msec/SSCH    msec/SSCH    msec/SSCH    msec/SSCH
AR 0015
AR 0015   46D        13605       0.169        0.317        0.002        0.489
AR 0015   46E        18855       0.146        0.177        0.005        0.329
AR 0015   970        40342       0.148        0.163        0.000        0.311
AR 0015   971        26089       0.150        0.166        0.000        0.317
AR 0015   972        12318       0.150        0.173        0.000        0.325
AR 0015 1I40I   READY
```

- SIR PMRMON

```
sir pmrmon
AR 0015                  PAGE MANAGER MONITORING REPORT
AR 0015               (BASED ON A 0000:00:21.879 INTERVAL)
AR 0015 IPFQ 31-BIT      =          0   IPFQ 64-BIT      =          0
AR 0015  PSQ 31-BIT      =     484924    PSQ 64-BIT      =    6746514
AR 0015 PF EXCH TOTAL    =      16445   PF EXCH 31->64   =      16445
AR 0015 PF EXCH 64->31   =          0   PGFLT TOTAL      =     179742
AR 0015 PGFLT PMGR       =     176790   PGFLT USER       =       2950
AR 0015 PGFLT IMM PO 31  =          2   PGFLT IMM PO 64  =      16446
AR 0015 SELCT ON PSQ 31  =      16447   SELCT ON PSQ 64  =      88394
AR 0015 SELC R=1 MAX 31  =          3   SELC R=1 MAX 64  =          6
AR 0015 RECLAIMS         =       4193   NPSQ LOW         =          0
AR 0015 PGOUT I/O TOTAL  =      48444   PGIN I/O TOTAL   =          0
AR 0015 PGOUT I/O UNC.   =      13071   PGOUT I/O PRE.   =      35373
AR 0015 LRA PGM CHECK    =          0   TFIX 64-BIT FR   =          0
AR 0015 HWM MB FRM-64    =          0   HWM MB FRM-31    =          0
AR 0015 MB FRM TFIX RPL  =          0   MB FRM PGO RPL   =          4
AR 0015 1I40I   READY
```

STACK – Stack Attention Routine commands

- The STACK command can be used to
  - Abbreviate z/VSE commands
  - Suppress or change any z/VSE command
  - Prepare a sequence of commands and/or replies

```
stack MV|MAP &0|GETVIS &0|
AR 0015 1I40I  READY
stack show
AR 0015 VIS|GETVIS &0,ALL
AR 0015 MV|MAP &0|GETVIS &0|
AR 0015 1I40I  READY
mv bg
AR 0015 1I40I  READY
AR 0015 MAP BG
AR 0015  PARTITION: BG        SPACE-GETVIS.....:     (N/A)
AR 0015  SPACE....: 0         ALLOC (VIRTUAL)...:    6144K  ADDR: 400000
AR 0015  STATUS...: VIRTUAL     SIZE............:    1280K
AR 0015  POWER-JOB: PAUSEBG
AR 0015  JOBNUMBER: 328         GETVIS..........:    4864K  ADDR: 540000
AR 0015  JOBNAME..: PAUSEBG
AR 0015  PHASE....:
AR 0015  TASKS....: ANY       PFIX(BELOW)-LIMIT :       0K
AR 0015                                  -ACTUAL:       0K
AR 0015                       PFIX(ABOVE)-LIMIT :       0K
AR 0015                                  -ACTUAL:       0K
AR 0015 1I40I  READY
AR 0015 GETVIS BG
AR 0015 GETVIS AREA FOR BG IS NOT INITIALIZED
AR 0015 1I40I  READY
```

TAPE – activate processing options for tape devices

- Activates special processing options for tape devices
  - Change tape unload processing
  - Change the information that is displayed on the “Load Display LED”
  - Change the Write Tape Mark (WTM) behavior

```
tape
AR 0015 TAPE    RUN=OFF,UNL=UNL,DSPLY=VOL,WTM=SYNC
```

TIME – display or alter Time-Of-Day (TOD)

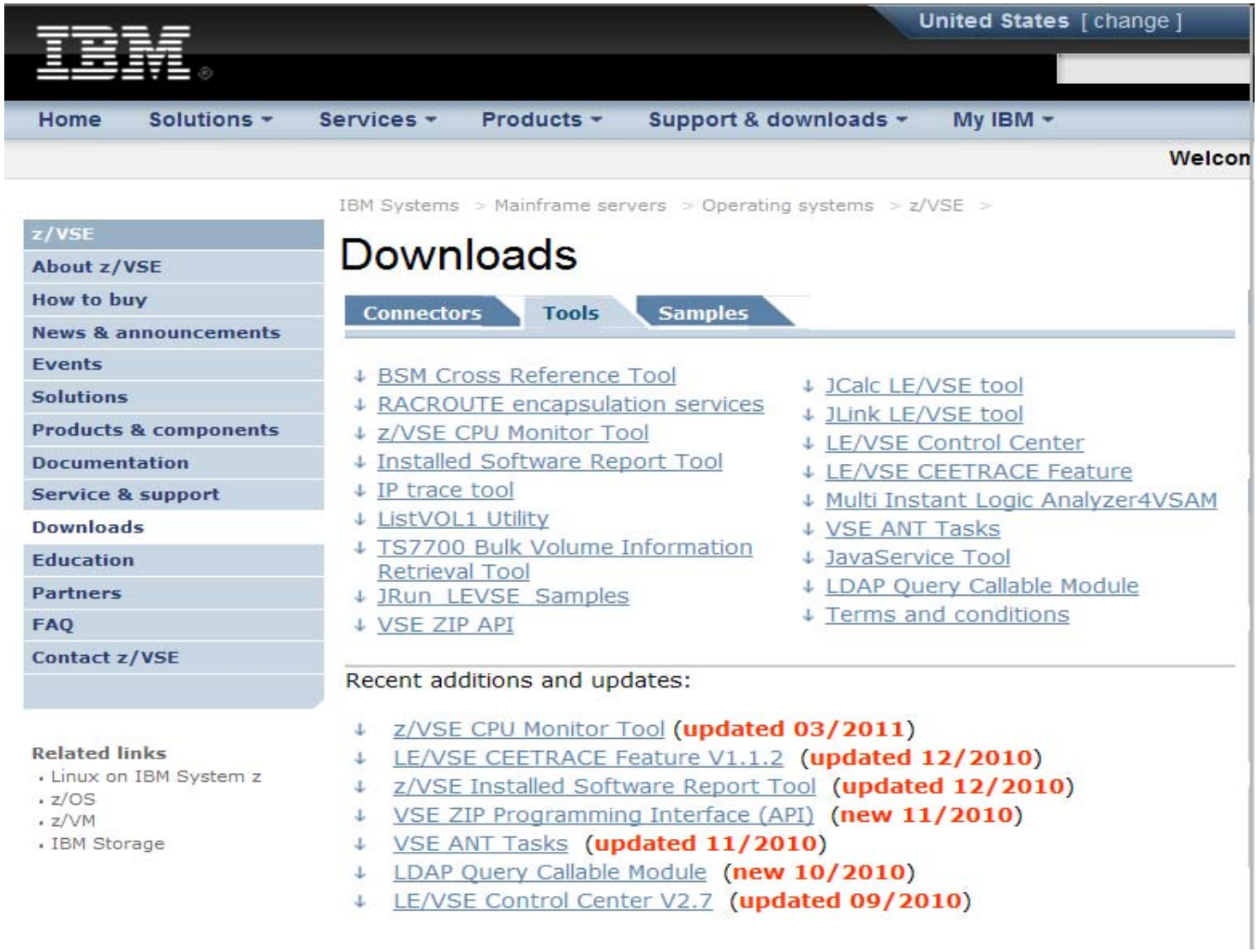
- TIME is functional equivalent to the IPL SET DATE command
  - Described in System Control Statements
- Be careful when using the TIME command to alter the TOD
  - The change may have impact on subsystems, vendor products and job accounting
  - Use it in test systems only, use the IPL SET DATE command for production
- Day-Light Saving time changes
  - Backward change most critical
  - Recommendation: use the IPL SET DATE command to adjust the local time

LOCK display and trace

- The Attention Routine LOCK command displays and traces LOCK/UNLOCK events
- LOCK SHOW[=pid]|[resource name] to display lock resources
  - pid = SYSLOG id
- LOCK TRACE to activate the trace
- LOCK TRACE[=pid][,resource name] to trace all, a partition and/or a specific resource

```
lock show=f2
AR 0025 LOCKTAB ENTRY
V0006F7D0  ........ 7FFA0A80 00000000 C4E3E2E5 *     "³ 0     DTSV*
V0006F7E0  C5C3E3C2 40404040 11800001 0006F7F4 *ECTB      0     74*
V0006F7F0  0006F7B4                            *  7©              *
AR 0025 OWNER ELEMENT
V7FFA0A80  00000000 01F40000 00011000 00000000 *      4           *
AR 0025 LOCKTAB ENTRY
V7FFA0FE0  0006F844 00000000 E5C4D6E2 D9C5E200 *  8à     VDOSRES  *
V7FFA0FF0  00000000 04C00000 7FFA0FC0 0006F814 *      {  "³ {  8  *
AR 0025 OWNER ELEMENT
V0006F840  ........ 7FFA0EF0 00200001 00000000 *     "³ 0         *
V0006F850  00000000                            *                  *
```

z/VSE Downloads

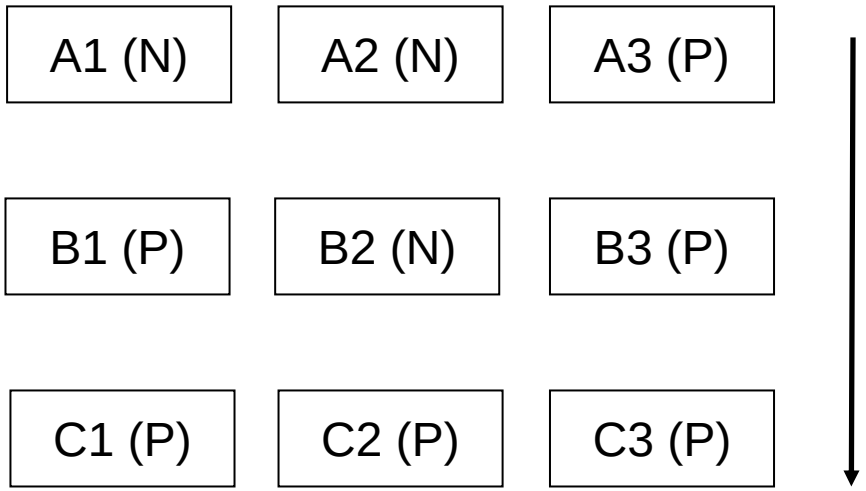


Problem management tools

- ABEND / system dump
  - Amount of dump data dependent on JCL OPTIONs
- DUMP command
  - Attention Routine command
- Stand-alone dump (program)
  - Create a stand-alone dump tape for the release you have in production
  - Have standalone dump tapes ready, just in case you need it
  - Always “STORE STATUS” before you take a standalone dump
- SDAID
  - To trace application programs and system events
- Interactive trace
  - // EXEC <program>,TRACE to trace applications
- DEBUG
- z/VM CP TRACE command

- Internal Attention Routine Commands
- *Turbo Dispatcher*
- CICS/VSE – CICS TS
- VSAM Migration to z/VSE 4.3

Turbo Dispatcher …



	CPU 0	CPU 1
Step 1	A1 (N)	B1 (P)
Step 2	C1 (P)	A2 (N)
Step 3	B2 (N)	A3 (P)
Step 4	C2 (P)	B3 (P)
Step 5		C3 (P)

Ax, Bx, Cx = work unit x of JOB A, B, C
(N) = non-parallel work units
(P) = parallel work units

Multiprocessing considerations

- VSE workload can exploit up to 3 CPUs
- One partition can only exploit the power of one CPU
- A lower non-parallel share value will allow a better multiprocessor exploitation.
- Try to minimize the number of CPUs to run your workload
  - A faster single CPU is better instead of adding CPUs
  - To reduce the multiprocessor overhead

How to monitor the Turbo Dispatcher

- System Activity Dialog
  - IUI dialog (host based): shows numbers of active CPUs, CPU utilization, non-parallel share, SHARE values, etc.
- z/VSE Console display
  - shows that TD is active and number of active CPUs
- z/VSE command: QUERY TD
- z/VSE CPU Monitor Tool
- Performance monitor from vendor, e.g.
  - Explore from CA
  - TMON from ASG

How to monitor the Turbo Dispatcher

- System Activity Dialog (361)

```
IESADMDA              DISPLAY SYSTEM ACTIVITY              15 Seconds  10:24:06
*----- SYSTEM (CPUs:   1 /   0 ) -----* *------------ CICS : DBDCCICS ------------*
|CPU       :  12%   I/O/Sec:     1   | |No. Tasks:            Per Second :        |
|Pages In  :    0   Per Sec:     *   | |Dispatchable:         Suspended  :        |
|Pages Out:     0   Per Sec:     *   | |Curr. Active:         MXT reached:        |
*-----------------------------------* *----------------------------------------*
Priority: Z,X,Y,S,R,P,C,BG=FA=F9=F8=F6=F5=F4,F2,F7,FB,F3,F1

 ID S JOB NAME  PHASE NAME  ELAPSED     CPU TIME   OVERHEAD   %CPU        I/O
 F1 1 POWSTART    IPWPOWER   00:05:02         .03        .03               3,172
 F3 3 VTAMSTRT    ISTINCVT   00:05:01         .03        .02               2,715
 FB B SECSERV     BSTPSTS    00:05:02         .01        .00                 369
 F7 7 <=WAITING FOR WORK=>                  .00        .00                   2
```

- z/VSE Console display

```
SYSTEM:   z/VSE                z/VSE 4.3          TURBO (03)        USER:   SYS
VM USER ID:SALMTEST                                                 TIME:   12:46:08
BG-0000 // PAUSE
F2 0501 4228I FILE IESPRB     OPEN  ERROR X'76'(118) CAT=VSESPUC
   (OPND1-5 ) WARNING:FILE WAS NOT CLOSED ON A PREVIOUS OUTPUT-OPEN
sysdef td,stopq=1
F2 0501 4228I FILE IESPRB     OPEN  ERROR X'72'(114) CAT=VSESPUC
   (OPNPR-40) WARNING:CATALOG CHECKER DETECTED IRREGULARITIES
```

How to monitor the Turbo Dispatcher

- SIR Attention Routine Command (no additional CPU started)

```
sir
AR 0015 CPUID  VM = 003B0B8220978000           VSE = FF3B0B8220978000
AR 0015 PROCESSOR = IBM 2097-722 51 (70B8251)  LPAR = SPB       No. = 0059
AR 0015      CPUs = 0003 (Ded.=0000 Shr.=0003) Cap. =  13%
AR 0015 VM-SYSTEM = z/VM    6.1.0   (1101)   USERID = SALMTEST VMCF = ON
AR 0015      CPUs = 0006                      Cap. = 100%
AR 0015 PROC-MODE = z/Arch(64-BIT)  IPL(007)    09:38:50      09/23/2011
AR 0015 SYSTEM    = z/VSE           4.3.0 GA                  09/29/2010
AR 0015             VSE/AF          8.3.0       GA-LEVEL      08/20/2010
AR 0015             VSE/POWER       8.3.0       DY-BASE       08/20/2010
AR 0015 IPL-PROC  = $IPLESA         JCL-PROC  = $$JCL
AR 0015 SUPVR     = $$A$SUPI        TURBO-DISPATCHER (71) ACTIVE
AR 0015                                HARDWARE COMPRESSION ENABLED
AR 0015 SEC. MGR. = BASIC              SECURITY  = ONLINE
AR 0015 VIRTCPU   = 0000:00:02.216           CP = 0000:00:00.528
AR 0015 CPU-ADDR. = 0000(IPL)   ACTIVE
AR 0015   ACTIVE  = 0000:00:01.624   WAIT = 0000:14:54.896
AR 0015   PARALLEL= 0000:00:00.358   SPIN = 0000:00:00.000
AR 0015 CPU-ADDR. = 0001          CPU INACTIVE NOT PREFIXED
AR 0015 CPU-ADDR. = 0002          CPU INACTIVE NOT PREFIXED
AR 0015 CPU-ADDR. = 0003          CPU INACTIVE NOT PREFIXED
AR 0015 CPU-ADDR. = 0004          CPU INACTIVE NOT PREFIXED
AR 0015 CPU-ADDR. = 0005          CPU INACTIVE NOT PREFIXED
```

How to monitor the Turbo Dispatcher

- SIR Attention Routine Command (additional CPUs started)

```
sir
AR 0015 CPUID  VM = 003B0B8220978000          VSE = FF3B0B8220978000
AR 0015 PROCESSOR = IBM 2097-722 51 (70B8251)  LPAR = SPB       No. = 0059
AR 0015      CPUs = 0003 (Ded.=0000 Shr.=0003) Cap. =  13%
AR 0015 VM-SYSTEM = z/VM    6.1.0   (1101)   USERID = SALMTEST VMCF = ON
AR 0015      CPUs = 0003                     Cap. = 100%
AR 0015 PROC-MODE = z/Arch(64-BIT)  IPL(007)    12:45:15      09/23/2011
AR 0015 SYSTEM    = z/VSE           4.3.0 GA                  09/29/2010
AR 0015             VSE/AF          8.3.0       GA-LEVEL      08/20/2010
AR 0015             VSE/POWER       8.3.0       DY-BASE       08/20/2010
AR 0015 IPL-PROC  = $IPLESA         JCL-PROC  = $$JCL
AR 0015 SUPVR     = $$A$SUPI          TURBO-DISPATCHER (71) ACTIVE
AR 0015                               HARDWARE COMPRESSION ENABLED
AR 0015 SEC. MGR. = BASIC             SECURITY   = ONLINE
AR 0015 VIRTCPU   = 0000:00:04.619          CP = 0000:00:01.002
AR 0015 CPU-ADDR. = 0000(IPL)    ACTIVE
AR 0015   ACTIVE  = 0000:00:00.784    WAIT = 0000:04:34.718
AR 0015   PARALLEL= 0000:00:00.738    SPIN = 0000:00:00.000
AR 0015 CPU-ADDR. = 0001         ACTIVE
AR 0015   ACTIVE  = 0000:00:00.000    WAIT = 0000:04:00.692
AR 0015   PARALLEL= 0000:00:00.000    SPIN = 0000:00:00.000
AR 0015 CPU-ADDR. = 0002         ACTIVE
AR 0015   ACTIVE  = 0000:00:00.619    WAIT = 0000:04:34.892
AR 0015   PARALLEL= 0000:00:00.601    SPIN = 0000:00:00.000
AR 0015 CPU timings MEASUREMENT INTERVAL     0000:04:36.610
```

How to monitor the Turbo Dispatcher

- SIR MON Attention Routine Command
  - Can help to analyze performance problems
  - Provides counters for
    - SVCs
    - Fast (107) SVCs and function codes
    - TD Service SVCs and function codes
    - MVS SVCs
    - Program Call codes
    - Bound conditions
    - TD performance (15 counters)

How to monitor the Turbo Dispatcher

- SIR MON Attention Routine Command …

```
sir mon
AR 0015                        MONITORING REPORT
AR 0015                 (BASED ON A 0000:00:16.680 INTERVAL)
AR 0015                        SVC SUMMARY REPORT
AR 0015 EXCP      =          53  WAIT     =          38  SETIME   =          17
AR 0015 SVC-0D    =          57  SYSIO    =       37949  EXIT IT  =          34
AR 0015 SETIME    =          15  WAITM    =          18  COMREG   =          20
AR 0015 GETIME    =           1  POST     =          26  SVC-31   =          11
AR 0015 TTIMER    =           3  SVC-35   =         109  GETVIS   =          88
AR 0015 FREEVIS   =          69  CDLOAD   =           1  SECTVAL  =           5
AR 0015 FASTSVC   =         579  (UN)LOCK =           2  SVC-75   =          65
AR 0015 PRODID    =           2  SVC-83   =         200  SVC-84   =         147
AR 0015                        SVC-X'6B' DETAIL REPORT
AR 0015    FC-02 =          25     FC-03 =          78     FC-06 =         109
AR 0015    FC-08 =          26     FC-09 =         100     FC-0A =          76
AR 0015    FC-0D =          16     FC-0E =         192     FC-4F =           1
AR 0015    FC-67 =           1     FC-73 =          60     FC-86 =          22
AR 0015    FC-90 =          62     FC-96 =           7     FC-9F =         156
AR 0015    FC-B6 =          16
AR 0015                        SVC-X'75' DETAIL REPORT
AR 0015    FC-98 =          57     FC-9C =           8
AR 0015                        MVS-SVC'S DETAIL REPORT
AR 0015 SVC-01    =          79  SVC-02   =          43  SVC-22   =           2
AR 0015 SVC-2E    =           2  SVC-2F   =          23  SVC-6B   =         141
AR 0015 SVC-77    =          57
```

How to monitor the Turbo Dispatcher

- How to gather monitored information:

  1) SIR MON=ON - starts monitoring
  2) SYSDEF TD,RESETCNT - resets TD counters
  3) <monitor interval - e.g. 1 hour at peak>
  4) SIR MON=OFF - stops monitoring
  5) QUERY TD - displays CPU counters
  6) SIR MON - displays SVC counters
  7) To start next interval begin with 1)

- Monitored data can be retrieved from VSE Console

CPU Balancing

- Introduces with z/VSE 4.2
- When CPU balancing is activated,
  the z/VSE Turbo Dispatcher will only use CPUs required for the current workload
- Can be activated and deactivated via AR/JCL command
  - SYSDEF TD,INT=0 to deactivate, default
  - SYSDEF TD,INT=nn (=1..99) to activate and “nn” interval in seconds, after which the CPU utilization is inspected
- Threshold can be defined after which an additional CPU is activated
  - SYSDEF TD,THR=nn (10..99) in percent, default: 50

z/VSE 4.2: CPU Balancing …

- CPU balancing via stop or quiesce process
  - SYSDEF TD,INT=nn,STOP - the stop process to be used
    - May provide performance improvements for z/VM 5.4 guests
  - SYSDEF TD,INT=nn,STOPQ - the quiesce process to be use, default
- QUERY TD shows current settings
- CPU balancing may reduce multiprocessing overhead

CPU Balancing …

Retrieve CPU time values: QUERY TD

```
query td
AR 0015  CPU   STATUS    SPIN_TIME    NP_TIME TOTAL_TIME NP/TOT
AR 0015   00   ACTIVE            0      63715      96636  0.659
AR 0015   01   ACTIVE            0      13668      22614  0.604
AR 0015   02   INACTIVE        210      23692      34187  0.693
AR 0015                  ------------------------------------
AR 0015 TOTAL                 210     101075     153437  0.658
AR 0015
AR 0015              NP/TOT: 0.658      SPIN/(SPIN+TOT): 0.001
AR 0015  OVERALL UTILIZATION:  80%       NP UTILIZATION:  53%
AR 0015
AR 0015  CPU BALANCING (STOP):  INT:   9 SECONDS     THR:  50%
AR 0015
AR 0015  ELAPSED TIME SINCE LAST RESET:       190550
AR 0015 1I40I  READY
```

TOTAL_TIME = CPU time used by workload
NP_TIME = non-parallel CPU time, contained in TOTAL_TIME
SPIN_TIME = CPU time needed to wait for a non-parallel work unit
All above values given in milliseconds.

NP/TOT = ratio NP_TIME / TOTAL_TIME = non-parallel share
SPIN/(SPIN+TOT) = spin time ratio

- Internal Attention Routine Commands
- Turbo Dispatcher
- *CICS/VSE – CICS TS*
- VSAM Migration to z/VSE 4.3

CICS on z/VSE

- Two different CICS products on z/VSE:
  - CICS/VSE 2.3
    - In service for about 17 years and whose
    - End-of-Support (EOS) date is October 2012
    - z/VSE 4.2: last release that includes CICS/VSE in z/VSE package
    - z/VSE 4.3: DL/I and CICS/VSE cannot be used
    - z/VSE 5.1: CICS/VSE not supported
  - CICS TS 1.1.1
    - In service for 10 years
    - Migration target for CICS/VSE
    - Recommendation: If your are still running application on CICS/VSE, migrate them to CICS TS prior to z/VSE 4.3

CICS/VSE to CICS TS for VSE/ESA Migration

- The best description of how to do this can be found in the Redbooks:
  - SG24-5595
  - SG24-5624
  - SG24-5997
- Although these publications are old, they are still very relevant.
- RPG II support is now available, but the programs are defined as Assembler.
  – On z/VSE 4.2 and higher
- Macro-Level programs are supported by installing OEM software.
- Some customers have left bits of redundant Macro-Level code in place, and this has caused abends, but can normally be removed very easily.
- Even a simple migration without exploiting any of the enhancements can significantly improve the amount of storage for 24-bit mode programs.

What are the tasks that we see in CICS TS?

```
.    status g1
.    AR 0015 S61-G1 EVA10MST 82 WAITING FOR I/O, OR ECB POSTING   console subtask (low priority)
.    AR 0015    TCB=00349BBC TIB=00349B40 SAV=006052A0
.    AR 0015 S62-G1 DFHEVID2 82 WAITING FOR I/O, OR ECB POSTING   auxiliary trace subtask
.    AR 0015    TCB=0035607C TIB=00356000 SAV=002CFC80
.    AR 0015 S63-G1 DFHEVID1 82 WAITING FOR I/O, OR ECB POSTING   RO subtask
.    AR 0015    TCB=0035634C TIB=003562D0 SAV=002CFD00
.    AR 0015 S64-G1 DFHEVID1 83 READY TO RUN                      QR subtask
.    AR 0015    TCB=0035661C TIB=003565A0 SAV=002CFD80
.    AR 0015 S65-G1 DFHEVID1 82 WAITING FOR I/O, OR ECB POSTING   SL subtask
.    AR 0015    TCB=003568EC TIB=00356870 SAV=002CFE00
.    AR 0015 S66-G1 DFHEVID1 82 WAITING FOR I/O, OR ECB POSTING   SO subtask
.    AR 0015    TCB=00356BBC TIB=00356B40 SAV=002CFE80
.    AR 0015 S67-G1 DFHEVID0 82 WAITING FOR I/O, OR ECB POSTING   JCP open/close subtask
.    AR 0015    TCB=0036007C TIB=00360000 SAV=002CFF00
.    AR 0015 S68-G1 DFHSKTSK 82 WAITING FOR I/O, OR ECB POSTING   file open/close, Rexx library I/O etc.
.    AR 0015    TCB=0036034C TIB=003602D0 SAV=002CFF80
.    AR 0015 M2D G1 COMSZCCA 82 WAITING FOR I/O, OR ECB POSTING   main task (mostly unused, lowest priority)
.    AR 0015    TCB=002DA2E8 TIB=002DA268 SAV=00600000
.    AR 0015    SCB=002DA000 PCB=002DA088 COM=002DA4F0
```

- Not shown above, DFHIRPST is for MRO, and additional DFHEVID1 are for FEPI=YES and for SSL support if they are active.
- The CICS subtask order is fixed, and is normally in low-to-high priority order.

z/VSE Partitions - GETVIS Usage

- The z/VSE GETVIS command shows usage e.g. GETVIS F2:

```
AR 0015 GETVIS USAGE    F2-24     F2-ANY                    F2-24     F2-ANY
AR 0015  AREA SIZE:   11,260K    51,196K
AR 0015  USED AREA:    8,660K    37,428K MAX. EVER USED:   11,260K    40,132K
AR 0015  FREE AREA:    2,600K    13,768K LARGEST FREE:      2,572K    13,656K
```

- xx-24 is below 16MB, xx-ANY includes above **and** below 16MB; this is due to the way that GETVIS works.
- For CICS TS, the xx-24 MAX. EVER USED is always the same as the AREA SIZE because of the way that DSALIM is allocated; the customer must issue a GETVIS xx,RESET command after initialisation to get a representative high-water-mark.
- If you use "GETVIS xx,ALL" or "GETVIS xx,DETAIL", most CICS TS usage will be seen in the "IMVSnnn" subpools, where "nnn" is the z/OS subpool number; always use the total of all IMVSnnn subpools to check for leaks.
- Always make sure that you have several MB of GETVIS storage free above the 16MB line in case you need it.

CICS SVA-Eligible Phases

- Using the SVA saves CICS partition-level virtual storage, z/VSE real storage, and may improve the (cache) performance of z10, z196 and z114 processors.
- The CICS TS SIT must have SVA=YES to enable it to load an SVA-resident phase, and CSD-defined SVA-resident programs must have USESVACOPY(YES).
- Most CICS SVA-eligible nucleus phases (",SVA" on the link-edit PHASE statement) are **candidates** for loading into the SVA, i.e. the customer must decide whether or not to load them after the IPL - do not load CICS SVA-eligible phases if CICS/VSE and CICS TS are use in the same VSE system.
- Phases can be re-loaded if there is enough free space, and it is possible to "inactivate" the SVA-resident version of any phase providing it does not need to run in the SVA.
- The CICS phases that **must** be in the SVA are in the load list $SVACICS.PHASE and are show in the LIBR LISTDIR SDL output .
- If a PTF or a relief fix supplied by CICS L3 Service links a phase such as DFHIRP that must be resident in the SVA, a re-IPL is the only safe way to re-load it.

z/VSE Workload Management and CICS

- Make sure that CICS is at a high priority, but below DB2, TCP/IP and VTAM.
- It is not a good idea to use a high priority TCP/IP for FTP while CICS is active, there are several ways round doing that.
- If partition balancing is active for a CICS partition, set an MSECS value that is lower than the default of 976 milliseconds.
- Use z/VSE CPU Balancing to reduce the number of CPUs to the number that you need to support the actual workload at any one point in time, this can reduce the amount of cpu time that would be needed to do the same work with more cpus active.
- Make sure that you are up-to-date with both CICS TS and TCP/IP fixes

CICS TS – Problem Determination

- CICS TS Trace settings
  - To help CICS Service debug dumps, we need CICS TS trace set to level 1 for all components, that is SIT STNTR=1.
  - We also need a trace table size of at least 4MB, that is SIT TRTABSZ=4096; this is acquired from GETVIS-31 storage.
  - CETR can be used to modify trace options while CICS is active.
  - AP=1-2 and EI=1-2 can be useful for diagnosing application problems.

- z/VSE dump configuration
  - The CICS startup job must have a
    // LIBDEF DUMP,CATALOG=SYSDUMP.sublib active
  - For batch EXCI dumps always use // OPTION DUMP to be set in the JCL
  - For CICS, we need // OPTION SYSDUMPC in the JCL to avoid a CICS dump being printed.

- SDAID traces
  - The z/VSE Supervisor may issue SVCs on behalf of CICS, if you trace SVCs and only specify the partition AREA address, you will not see these SVCs traced.
  - Add ADDR=0:* to the TRACE SVC

- DEBUG traces
  - Can be useful to obscure CICS loops and system problems

CICS TS performance considerations

- Monitoring software in its own partition must always be at a higher priority.
- Avoid all unnecessary system and transaction dumps, they can stop all CICS processing while they are being taken.
- Function Shipping
  - expensive compared local VSAM file I/O, don't be surprised if it multiplies response times by a factor of 2 or more, this is normal.
- MRO / ISC
  - MRO uses less cpu time than ISC, although the customer may not notice much improvement in response times.
  - MRO and, to a much lesser extent, ISC cpu usage increases as z/VSE uses more cpus - a "multiprocessor effect".
- Multiprocessing
  - z/VSE customers should use as few CPUs as possible to handle the workload, having more CPUs available than is needed costs CPU time.
  - CPU Balancing may help to reduce multiprocessor overhead

- Internal Attention Routine Commands
- Turbo Dispatcher
- CICS/VSE – CICS TS
- *VSAM Migration to z/VSE 4.3*

VSAM Migration to z/VSE 4.3 or z/VSE 5.1

- Migration of VSAM catalogs
  - Don't use Fastcopy to migrate VSAM catalogs
  - Flashcopy all VSAM volumes allocated to a VSAM catalog
  - Migrate all recoverable VSAM catalogs to standard VSAM catalogs
    - **Before** the migration to z/VSE 4.3 or z/VSE 5.1
- Apply the latest PFT level to z/VSE 4.3.1

More Information

… on VSE home page: http://ibm.com/vse

- Hints and Tips for z/VSE V4.2:
  ftp://ftp.software.ibm.com/eserver/zseries/zos/vse/pdf3/zvse41/hint9mm2.pdf

  Hints and Tips for z/VSE V4.3 will be available soon.