Managing Linux Using 'Hidden' Tools in z/VM

Jim Elliott
Linux Advocate, @server Strategic Initiatives
IBM Canada Ltd.

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Abstract

- Over the years IBM has added a lot of utility functions to what is now z/VM and its features. For most people, these utilities remain a hidden secret as they are buried in the large library of z/VM's documentation. Topics will include the using the FCON tool, the z/VM RealTime Monitor (RTM) feature and the AUDITOR, ACCOUNT and PROP utility functions of CMS, among many others! This session will bring to light these utilities and provide an overview of how they can be used to make your life easier in managing and monitoring your Linux for zSeries and Linux for S/390 images.

- This session qualifies for the Linux on S/390 certificate track.
Agenda

- System Utilities
- PROP
- Operating a Linux Virtual Machine
- VM Download Packages
- FCON
- RTM

IBM z/VM publications are available at ibm.com/vm/library
System Utilities
CMS Command and Utility Reference, SC24-6010

- ACCOUNT - Provides basic processing of z/VM accounting records
- AUDITOR - Monitors virtual machine status
- DIRMAP - Creates a map of all minidisk and link statements in the user directory
- QSYSOWN - Maps system disk space
- SFPURGER - Manages spool space and spool files
ACCOUNT

System Utilities

- Processes accounting records collected using the CP RETRIEVE command from the *ACCOUNT system service
- Only basic accounting records are processed
  - Virtual machine resource use, Dedicated device use and temporary disk space use (codes 01, 02 and 03)
  - User written application required for processing of all accounting records (defined in HCPACOBK)
    - REXX exec or use DTRYACC ASSEMBLE on MAINT 393 as a base
- Selective processing possible by userid, account number and project number
- Use VMSERVE to issue CP ACNT CLOSE command at end of shift to enable shift reporting
  - VMSERVE can also be used to initiate automatic processing of accounting records
AUDITOR
System Utilities

- Monitors status of selected virtual machines
  - Running properly
  - Logged off
  - Disabled wait state
  - Failed user tests
- Restart virtual machines which fail test
- Automated tool with operator command support

```
* AUDITOR CONTROL
* MACHINE TEST AUTO FORCE TEST MAX NOTIFY
* ID INTERVAL LOG &AUTO EXIT ERRS USER ID
```

```
APACHE  00:01:00 1 1 WEBTEST 10 OPERATOR
LINUX1  00:30:00 1 1 NONE 10 OPERATOR
SMBSRV  00:01:00 1 1 SMBTEST 10 OPERATOR
```
DIRMAP
System Utilities

- MDISK/LINK mapping utility
- Processes the USER DIRECT file
- Output files
  - MDISKMAP - Map of all MDISKs
  - LINKMAP - Cross reference of all LINK statements
  - GAPFILE - List of all available "gaps"
- See also the DISKMAP command in the 
  CP Command and Utility Reference, SC24-6008
**QSYSOWN**
*System Utilities*

- Reports availability and use of system disk space
  - Page and spool space
  - Number of pages available and in use
  - Percent of pages in use
- CP QUERY ALLOC command for detailed information

**Summary Information:**

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<thead>
<tr>
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</tbody>
</table>
SFPURGER
System Utilities

- Manage spool space and spool files
- Purge, ignore or place holds on a spool file
- User-written action routines supported

********************************************************************************
* Sample SFPURGER CONTROL File
********************************************************************************
* Ignore any spool files found in the NSS queue (privilege class E)
  QUEUE NSS
* Purge any spool files found in class 0
  CLASS 0
* Keep spool files owned by maintenance user IDs
  USERID MAINT*
* Purge dump files after 4 weeks. Ignore the rest
  TYPE DMP    DAYS 29
  TYPE DMP
* Change console logs to system hold after 1 week
  TYPE CON    DAYS 8
* Purge any reader files in USERHOLD after 4 weeks. Ignore the rest
  QUEUE RDR    DAYS 28
  QUEUE RDR
* Purge any other print files after 2 weeks. Change the rest
  to USERHOLD
  QUEUE PRT    DAYS 15
  QUEUE PRT
********************************************************************************
Programmable Operator Facility
CMS Planning and Administration, SC24-6042

- PROP is designed to increase the efficiency of system operation by intercepting all messages and requests directed to its virtual machine and by handling them according to preprogrammed actions.
- The tasks that can be performed by the programmable operator facility include:
  - Logging messages
  - Suppressing message display and routing messages to a logical (real) operator
  - Executing commands
  - Responding with preprogrammed message responses
Operating a Linux Virtual Machine
Running Guest Operating Systems, SC24-5997

- Problem determination
  - Application documentation
  - Linux console messages
  - /var/log
  - Linux distributor or service organization
- Automatically booting Linux
  - CP XAUTOLOG command
  - AUTOLOG1 userid
- Analyzing performance
- CP commands to know at the Linux operator's console
Analyzing Performance
Operating a Linux Virtual Machine

- Performance tools from IBM
  - ibm.com/vm/perf
- RTM - Short-term study or problem solving
  - ibm.com/vm/related/rtm
- PRF - Long-term trend analysis or capacity planning
  - ibm.com/vm/related/prf
- FCON - The best of both, coming soon to z/VM!
- RMF PM with support for Linux
  - ibm.com/eserver/zseries/zos/rmf/rmfhtmls/pmweb/pmlin.htm
- Performance publication
  - ibm.com/vm/perf/docs
Analyzing Performance ...
Operating a Linux Virtual Machine

- CP commands to enhance performance
  - INDICATE - Broad overview of how system resources are being used
  - LOCK - Lock in real storage selected pages
  - SET SHARE - Control percentage of system resources a guest receives
  - SET QUICKDSP - Designate guests that don't wait in the eligible list
  - SET RESERVED - Set number of pages resident in real storage
  - DEDICATE - Allocate a processor to a guest
CP Commands to Know at the Linux Operator's Console
Operating a Linux Virtual Machine

- **COUPLE**
  - Connect a virtual channel-to-channel adapter (CTCA) to a compatible virtual CTCA
  - Connect a virtual adapter (NIC) to a compatible virtual LAN segment

- **DEFINE**
  - Change the configuration of your virtual machine
  - Change the configuration of your operating system
  - Add a new VM LAN to your system

- **DETACH**
  - Virtual processors from your virtual machine
  - Real and logical devices from the host system
  - Real, logical and virtual devices from your virtual machine
  - A VM LAN segment from the host system
CP Commands to Know at the Linux Operator's Console ...

Operating a Linux Virtual Machine

- **ATTACH**
  - Real or logical device to a virtual machine
  - Disk to the host system

- **DISPLAY**
  - The contents of first-level storage
    - The real storage of the processor
  - The contents of second-level storage
    - The storage that appears real to the operating system running in your virtual machine
  - The contents of third-level storage
    - The storage that appears virtual to the operating system running in your virtual machine
  - The old and new PSWs, interrupt information and registers
CP Commands to Know at the Linux Operator's Console ...

Operating a Linux Virtual Machine

- TERMINAL HOLD
  - Control whether CP displays the HOLDING status when the terminal screen is full
- TERMINAL MORE
  - Change the number of seconds that elapse between the time when CP issues the MORE... state and sounds the terminal alarm before CP clears the screen
- TRACE
  - Monitor events that occur in your virtual machine
- VMDUMP
  - Dump all or selected pages from second-level storage

*CP Command and Utility Reference, SC24-6008*
VM Download Packages
ibm.com/vm/download/packages

- CMSDDR - Enhanced DDR program to simulate DDR tapes via CMS files
- SMARTX - An XEDIT-based front-end for RTM
- SPOOLCHN - System programmer and system operator extended spool query commands
- VMSERVE - A service virtual machine manager that handles reader files, messages and time-of-day events
- LEXX - Live Parsing Editor
CMSDDR
VM Download Packages

- From Gerhard Widmayer, IBM Germany
- This package provides you with a kind of I/O redirection for DDR tapes into CMS files via a modified DDR Module
- It comes with a sample EXEC to perform DDR DUMP and RESTORE for minidisks
- A help file explaining the additional features is included
SMARTX
VM Download Packages

- From Kris Buelens, IBM Belgium
- The purpose of SMARTX is twofold:
  - Help the occasional users of RTM to find and execute the available RTM commands
  - Keep the data returned by RTM in an XEDITed CMS file.
- When in the XEDIT file, PFkeys are available for various functions:
  - Obtain description of the RTM keywords
  - Plot data using GDDM/REXX
  - Automatically repeat an RTM command
- The PROFSMRT XEDIT macro can be very useful when viewing saved SMART reports
SPOOLCHN
VM Download Packages

- From Richard Ross, IBM US
- SPOOLCHN is a VM system programmer utility (class C or E) which will display files in the spool system
- SPOOLCHN has the following advantages over the standard spool Query commands:
  - can show spool usage (blocks of spool data)
  - shows more information than the spool Query commands
  - output can be directed to terminal, stack, disk, or variables in REXX
  - output can include an exec for manipulating the spool files
  - more search criteria than spool Query, such as number of records, age of file, etc.
  - wildcard searches allowed
  - does not tie up system resources like Q RDR ALL
VMSERVE
VM Download Packages

- From Les Koehler, IBM US
- VMSERVE is a general purpose Disconnected Virtual Machine (DVM) manager for VM which will handle incoming reader files, messages, and time-of-day events
- VMSERVE has options to: Define the application name, Initiate extended console spooling, Turn internal tracing on, Perform a check of the run-time definitions, Override the internal interrupt priority scheme, Override the internal Reader and Message security checking sequence
- Although VMSERVE provides the facilities to accomplish the above, it is up to the application developer to properly implement the facilities necessary to meet their business needs
LEXX Live Parsing Editor
VM Download Packages

- From Mike Cowlishaw, IBM UK
- LEXX lets you manipulate the structure and the appearance of the data you are editing, whether it be a text document, a program, or any other suitable material
- The routines that control the appearance of the data being edited are called Live Parsers
- Included are:
  - A parser for Generalized Markup Language (GML) documents (SCRIPT files)
  - A parser for REXX programs, such as Execs and Editor Macros
LEXX Live Parsing Editor - Screen Image

VM Download Packages

/* LEXX: CMS command to invoke the Live Parsing Editor. */
/* Call with argument "?" for further information. */
/* ........ (C) Copyright IBM United Kingdom Ltd., 1987. */

Address command
Parse Arg fn ft fm . ' {' options '}' rest
If left(fn,1)='?' Then Signal HELPME
options=translate(options)

If cmsflag('SUBSET') Then Do
  Say "LEXX may not be called in CMS SUBSET"
  Exit -2
End

If cmsflag(cmstype) Then cmstype='RT'
  Else cmstype='HT'

txtlibs='LXMAIN SCEELKED CMSLIB IBMLIB'
lexmod ='LXAMAIN'
  'QUERY STORECLR ( LIFO): Parse Pull .. storeclr
If storeclr='ENDSVC' Then 'SET STORECLR ENDCMD'

PF1 Help  PF2 Opencl  PF3 Quit  PF4 Copy  PF5 Move  PF6 ?
PF7 Up    PF8 Down   PF9 =    PF10 Select PF11 Splitj PF12 Focus
# LEXX Live Parsing Editor - Additional Packages

## VM Download Packages

<table>
<thead>
<tr>
<th>Package name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEXXPLXX</td>
<td>Parsers for PL/I, PL/X, Modula-2 and Pascal</td>
</tr>
<tr>
<td>LEXXASM$</td>
<td>Parser for Assembler</td>
</tr>
<tr>
<td>LEXXC$$</td>
<td>Parser for C</td>
</tr>
<tr>
<td>LEXXCFDA</td>
<td>&quot;Commands From Data Area&quot; facility</td>
</tr>
<tr>
<td>LEXXCOB$</td>
<td>Parser for COBOL</td>
</tr>
<tr>
<td>LEXXFOR$</td>
<td>Parser for FORTRAN</td>
</tr>
<tr>
<td>LEXXRX$$</td>
<td>Alternate parser for REXX</td>
</tr>
<tr>
<td>LEXXTEX$</td>
<td>Parser for LaTeX/TeX Parser</td>
</tr>
<tr>
<td>LXFINDT</td>
<td>FIND Token command</td>
</tr>
<tr>
<td>LXJCL$</td>
<td>Parser for MVS JCL</td>
</tr>
<tr>
<td>LXPRMPT</td>
<td>Prompt command</td>
</tr>
</tbody>
</table>
**FCON**

*Coming to z/VM as a Feature Soon!*

- The 'Full Screen Operator CONsole and Graphical Real Time Performance Monitor' (FCON) is a CMS utility designed to assist operators and systems programmers or analysts in the following areas:
  - System console operation in full screen mode
    - Designed to facilitate the operation of VM systems, thereby improving operator efficiency and productivity
  - Performance monitoring on z/VM systems
    - An enhanced real time performance monitor allows systems programmers to monitor system performance and to analyze bottlenecks
    - Designed to improve the systems programmer's productivity when analyzing the system, and to allow even a more casual user to work efficiently with the tool
    - Helps systems programmers to make more efficient use of system resources, to increase system productivity and to improve end-user satisfaction
System Console Operation in Full Screen Mode
FCON for General System Operating

- General system output (informational messages and replies to commands entered) can automatically be scrolled, using an enhanced scrolling logic.
- Messages from other virtual machines are numbered and left pending at the top of the screen until explicitly deleted, even if automatic scrolling is active.
- The last few important "action" messages (number can be specified) can also be left pending at the top of the screen until explicitly deleted.
- Optionally additional processing of output lines which meet certain user specifications.
- A redisplay facility allows browsing through the day's accumulated console log, or through previous day's logs.
## Initial Performance Data Selection Menu

### FCON in Performance Monitor Mode

**Chart**

---

### General System Data
1. CPU load and trans.
2. Storage utilization
3. Storage subpools
4. Priv. operations
5. System counters
6. CP IUCV services
7. SPOOL file display
8. LPAR data
9. Shared segments
A. Shared data spaces
B. Virt. disks in stor.
C. Transact. statistics

### I/O Data
10. I/O configuration
11. Channel load
12. Control units
13. I/O device load
14. CP owned disks
15. Cache extend. func.
16. DASD I/O assist
17. DASD seek distance
18. I/O prior. queueing
19. I/O configuration
20. I/O config. changes

### User Data
21. User resource usage
22. User paging load
23. User wait states
24. User response time
25. Resources/transact.
26. User communication

### History Data (by Time)
27. Multitasking users
28. User configuration
29. Linux systems

---

### Additional Selections
30. Graphics selection
31. History data files
32. Benchmark displays
33. Correlation coeff.
34. System summary
35. Auxiliary storage
36. CP communications
37. DASD load
38. Minidisk cache
39. Paging activity
40. Proc. load & config
41. Logical part. load
42. Response time (all)
43. RSK data menu
44. Scheduler queues
45. Scheduler data
46. SFS/BFS logs menu
47. System log
48. TCP/IP data menu
49. User communication
50. User wait states
Monitoring Linux Performance
*FCON in Performance Monitor Mode*

- Based on the Linux DDS interface from RMF PM
  - DDS installed and active on all Linux systems monitored
  - Performance data is stored on the Linux systems
  - Performance data retrieved in XML format

- Performance reports
  - System data
  - CPU utilization details
  - Memory utilization and activity details
  - Network activity (overall and by device)
  - File system size and utilization

FCONX LINUXUSR:
*Linux-ID IP Address
*  
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
LINUX1 1.222.333.444:8803
LINUX2 1.222.333.445:8803
... ...
LINUXn 1.222.333.nnn:8803
Linux Performance Data Selection

FCON in Performance Monitor Mode

Interval 18:32:00-18:33:00, on 2002/08/06  (Select average for mean data)

Linux Performance Data Selection for System W3VML

System Data
Processes created per second 0.083
Context switches per second 113.1
Apache: Requests per second ...
  Bytes per request ...
  Busy threads ...
  Idle threads ...
  404 Errors per minute ...

S Perform. Reports      Description
_  LXCPU    W3VML      CPU utilization details
_  LXMEM    W3VML      Memory utilization & activity details
_  LXNETWRK W3VML      Network activity (overall & by device)
_  LXFILSYS W3VML      File system size and utilization
# Linux CPU Utilization Overview

**FCON in Performance Monitor Mode**

## Linux CPU Utilization for System W3VML

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<thead>
<tr>
<th>Processor</th>
<th>Total</th>
<th>User</th>
<th>Kernel</th>
<th>Nice</th>
<th>Idle</th>
<th>Total</th>
<th>User</th>
<th>Kernel</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU0</td>
<td>0.63</td>
<td>0.34</td>
<td>0.28</td>
<td>0</td>
<td>99.36</td>
<td>---</td>
<td>---</td>
<td>---</td>
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</tbody>
</table>

### Process Name

- `gpmdsdsv.5378`: 0.28 0.25 0.03 ... --- ... ...
- `pocgst.646`: 0.16 0.03 0.13 ... --- 32.64 4.79 27.85
- `gencat.633`: 0.03 ... 0.03 ... --- 4.82 ... 4.75
- `gpmdsdsv.654`: 0.01 0.01 ... ... ... ...
- `gpmdsdsv.6810`: 0.01 ... 0.01 ... ... ...
- `ncsd.338`: 0.01 ... 0.01 ... ... 208.9 29.04 179.9
- `gpmdsdsv.6818`: 0 0 0 0 ... ... ...
- `gpmdsdsv.68181`: 0 0 0 0 ... ... ...
- `gpmdsdsv.68182`: 0 0 0 0 ... ... ...
- `gpmdsdsv.24455`: 0 0 0 0 ... ... ...
- `gpmdsdsv.24465`: 0 0 0 0 ... ... ...
- `gpmdsdsv.27167`: 0 0 0 0 ... ... ...
- `gpmdsdsv.27168`: 0 0 0 0 ... ... ...
- `gpmdsdsv.29851`: 0 0 0 0 ... ... ...
- `gpmdsdsv.29852`: 0 0 0 0 ... ... ...
Real Time Monitor
Real Time Monitor, SC24-6028

- Provides real time performance information and action logging

<table>
<thead>
<tr>
<th>z/VM CPU2064 SERIAL 123456 512M DATE 03/10/02 START 03:19:12 END 03:19:43</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;USERID&gt; %CPU %CP %EM ISEC PAG WSS RES UR PGES SHARE VMSIZE TYP,CHR,STAT</td>
</tr>
<tr>
<td>USER52 92 45 47 .0 .0 70 70 .0 254 100 4M VUB,---,DISP</td>
</tr>
<tr>
<td>USER41 37 0 37 18 .0 41 41 .0 0 100 3M VUX,---,SIMW</td>
</tr>
<tr>
<td>USER90 36 2 34 19 .0 365 365 .0 257 100 6M VUB,QDS,DISP</td>
</tr>
</tbody>
</table>

<---- DEVICE ---> <----- DEVICE RDEV DATA -----> <-- MEASUREMENT FACILITY -->

<table>
<thead>
<tr>
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<tr>
<td>01A0 3380 PGPK02 1958 61 .00 .00 .00 1 4 15 2 0 0 2 15</td>
</tr>
<tr>
<td>0206 3380 DISK01 1458 45 1.7 .00 .00 92 4 69 15 0 12 2 12</td>
</tr>
<tr>
<td>0225 3350 DISK92 817 25 13 .00 .00 1140 4 10 4 0 0 3 9.4</td>
</tr>
<tr>
<td>03E2 3380 PGPK23 750 23 28 .00 .06 202 4 39 17 0 14 2 6.3</td>
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<-------- CPU STATISTICS --------> <-- VECTOR ----> <STORAGE><XSTORE>

<table>
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<tr>
<td>-&gt; 6 491 204 268 109 12 .06 45K 99 0 0 0 28 356 96 568 1.420</td>
</tr>
<tr>
<td>&lt;-- 290 76 203 110 11 .03 28K 98 .0 0 0 15 130 96 411 3.650</td>
</tr>
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</table>

+-----------------------------------------------+<-- 08 LOG ACTIONS INDICATED -->-+-----------------------------------------------+
Action Logging

Real Time Monitor

- RTM will monitor selected counters for "above limit" situations
- When the limit is exceeded, a message can be sent to a service machine to handle the exception

<table>
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<tr>
<th>03/10/02</th>
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<th>INTERVAL ANALYSIS LOG -----&gt; 11:51:49</th>
<th>ACTION</th>
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</thead>
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<tr>
<td>1) PAGE REQUEST LIMIT EXCEEDED: SYSTEM 32 SEC</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) SUPERVISOR LIMIT EXCEEDED: USER01 43%</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) SUPERVISOR LIMIT EXCEEDED: USER04 63%</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) PAGE REQUEST LIMIT EXCEEDED: USER88 72 SEC</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) EXCESSIVE CHANNEL PATH UTILIZATION: 25% CTCA-03F0</td>
<td>25</td>
<td></td>
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</table>

Set LOGMsg nn

ON/OFF LIMIT value USER userid OFF VMCF MSG
## Selected Log Messages

### Real Time Monitor

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<tr>
<th>LOGMSG</th>
<th>STATUS</th>
<th>LIMIT</th>
<th>MSGCT</th>
<th>USERID-</th>
<th>LOG MESSAGE 12:00:00 -&gt; 14:38:37</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>ON</td>
<td>100</td>
<td>0</td>
<td></td>
<td>IO RATE EXCEEDED nnnn</td>
</tr>
<tr>
<td>1</td>
<td>ON</td>
<td>0</td>
<td>0</td>
<td>OPERATOR</td>
<td>INTERVENTION REQUIRED:</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
<td>0</td>
<td>0</td>
<td>OPERATOR</td>
<td>USERID DISCONNECTED AND DISABLED</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
<td>50</td>
<td>82</td>
<td></td>
<td>STORAGE LIMIT EXCEEDED:</td>
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<tr>
<td>8</td>
<td>ON</td>
<td>40</td>
<td>0</td>
<td></td>
<td>SUPERVISOR LIMIT EXCEEDED:</td>
</tr>
<tr>
<td>10</td>
<td>OFF</td>
<td>120</td>
<td>0</td>
<td></td>
<td>userid HAS BEEN IDLE FOR nnn MINUTES</td>
</tr>
<tr>
<td>12</td>
<td>ON</td>
<td>25</td>
<td>0</td>
<td></td>
<td>PAGE REQUEST LIMIT EXCEEDED:</td>
</tr>
<tr>
<td>13</td>
<td>ON</td>
<td>90</td>
<td>12</td>
<td></td>
<td>CPU UTILIZATION nnn%</td>
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<tr>
<td>16</td>
<td>ON</td>
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<td>0</td>
<td></td>
<td>STORAGE UTILIZATION nnn%</td>
</tr>
<tr>
<td>18</td>
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<td>0</td>
<td>0</td>
<td>VOLUME volser</td>
<td>MOUNTED:</td>
</tr>
<tr>
<td>19</td>
<td>ON</td>
<td>100</td>
<td>43</td>
<td></td>
<td>I/O RATE LIMIT EXCEEDED:</td>
</tr>
<tr>
<td>21</td>
<td>ON</td>
<td>0</td>
<td>0</td>
<td></td>
<td>PROCESSOR VARIED OFFLINE:</td>
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<tr>
<td>22</td>
<td>ON</td>
<td>75</td>
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<td>EXCESSIVE DEVICE PERCENT UTILIZATION: nnn%</td>
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<tr>
<td>23</td>
<td>ON</td>
<td>500</td>
<td>56</td>
<td></td>
<td>EXCESSIVE DEVICE DISCONNECT TIME: nnnn</td>
</tr>
<tr>
<td>24</td>
<td>ON</td>
<td>100</td>
<td>310</td>
<td></td>
<td>EXCESSIVE QUEUING IN CHANNEL SUBSYSTEM: nnnn</td>
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<tr>
<td>25</td>
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<td>20</td>
<td>42</td>
<td></td>
<td>EXCESSIVE CHANNEL PATH UTILIZATION: nnn%</td>
</tr>
<tr>
<td>26</td>
<td>ON</td>
<td>0</td>
<td>0</td>
<td>OPERATOR</td>
<td>DISPATCH LIST ABSOLUTE SHARES NOT AVAILABLE</td>
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<tr>
<td>27</td>
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<td>0</td>
<td>OPERATOR</td>
<td>TABLE LIMIT EXCEEDED -</td>
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<tr>
<td>34</td>
<td>ON</td>
<td>0</td>
<td>0</td>
<td></td>
<td>XSTORE BLOCKS UNAVAILABLE nnn TIMES</td>
</tr>
<tr>
<td>35</td>
<td>ON</td>
<td>3000</td>
<td>4</td>
<td></td>
<td>AVERAGE TRANSACTION TIME: n.nnn SECONDS</td>
</tr>
<tr>
<td>36</td>
<td>ON</td>
<td>0</td>
<td>0</td>
<td></td>
<td>DEVICE DYNAMICALLY DELETED</td>
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</tbody>
</table>
Contact Information

Jim Elliott  
Linux Advocate  
IBM @server Strategic Initiatives  
IBM Canada Ltd.

jelliott@ca.ibm.com

ibm.com/vm/devpages/jelliott/
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