



Managing Linux Using 'Hidden' Tools in z/VM

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9212 Managing Linux Using 'Hidden' Tools in z/VM

- **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 Real Time Monitor (RTM) feature; and the AUDITOR, ACCOUNT and PROP utility functions of CMS, among many others!**
- **The speaker 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.**





Sources of information

- **z/VM library on the web**
 - www.vm.ibm.com/library
- **Help command**
- **Message lookup**





Help!

CMS User's Guide, SC24-6009

HELPIFNO	HELP Facility topics	LIBRARY	z/VM bibliography
MENUS	z/VM Help menus	MACROS	CMS assembler macros (menu)
TASKS	Basic z/VM tasks - good choice for beginners	MACROS	Assembler macros and functions (types)
COMMANDS	z/VM commands available to general users	MESSAGES	Messages and codes
CMS	CMS commands	OPEN	OpenExtensions services and APIs
CP	CP commands	PIPE	CMS Pipelines stages and subcommands
QUERYSET	QUERY and SET commands and subcommands	PIPE	CMS Pipelines tasks
TCPIP	TCP/IP commands	PRODUCTS	Other products running under z/VM
TCPIP	TCP/IP tasks	ROUTINES	CMS callable services (menu)
AVS	AVS commands	ROUTINES	CMS routines (types)
DUMPS	Dump commands, subcommands, and utilities	STATEMENTS	REXX, EXEC 2, and EXEC statements
DYNIO	Dynamic I/O tasks	SUBCMDSD	Subcommand groups, such as XEDIT
FEATURES	z/VM optional features	TSAF	TSAF commands
GLOSSARY	Definitions of terms	VMSES	VMSES/E commands
LE	Language Environment commands		



LookAt: Message lookup facility
www.ibm.com/zseries/zos/bkserv/lookat

LOOKAT Messages

1. Enter
 Message ID:

2. Select an area to LookAt!
Note: Platform selections below also include any IBM application software messages enabled for **LookAt**.

3. Click

Latest Alerts
 April 1, 2003
 Click [here](#) for details!

LookAt Mobile Edition
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 V1R3
 V1R2
 V1R1

OS/390™
 V2R10
 V2R9

z/VM™
 V4R3
 V4R2
 V4R1

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 V2R6
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5 | SHARE 102 - Session 9212 | 2004-02-27 | Linux



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 VMSEVERE to issue CP ACNT CLOSE command at end of shift to enable shift reporting**
 - VMSEVERE 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:
      Total-Pages
Type   Allocated  In-Use   %-Used
-----
SPOL   428040    169905   39.7
PAGE   744120    10278    1.4
    
```

```

** Detail Information:
      Total-Pages
Volser  Addr  Device  Type   Allocated  In-Use   %-Used
-----
ITSVMR  922C  3390   SPOL   20700     20698   100.0
        SPOL   11340     11338   100.0
        PAGE   15120      4554    30.1
        PAGE    9000        0      0.0
ITSW01  9205  3390   SPOL  396000    137869   34.8
        PAGE    0          0      0.0
    
```





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                                ACTION IGNORE
* Purge any spool files found in class 0
  CLASS 0                                  ACTION PURGE
* Keep spool files owned by maintenance user IDs
  USERID MAINT*                           ACTION IGNORE
* Purge dump files after 4 weeks. Ignore the rest
  TYPE DMP      DAYS 29                    ACTION PURGE
  TYPE DMP                                ACTION IGNORE
* Change console logs to system hold after 1 week
  TYPE CON      DAYS 8                     ACTION SYSHOLD
* Purge any reader files in USERHOLD after 4 weeks. Ignore the rest
  QUEUE RDR     DAYS 28                    HOLD USER  ACTION PURGE
  QUEUE RDR                                ACTION IGNORE
* Purge any other print files after 2 weeks. Change the rest
  to USERHOLD
  QUEUE PRT     DAYS 15                    ACTION PURGE
  QUEUE PRT                                ACTION USERHOLD
    
```





CMS utilities

- **CMS Pipelines - programmer productivity tool**
- **Programmable Operator (PROP)**
- **Fullscreen CMS**



CMS Pipelines

www.vm.ibm.com/pipelines



- **Programmer productivity tool for simple creation of powerful, reusable programs**
- **Lets you solve a complex problem by breaking it up into a series of smaller, less complex programs, called stages, that can then be hooked together to get the results you want**
- **Many built-in stages, but if you need a function that is not provided by CMS Pipelines, you can write your own stage, as many in the VM community already have done**
- **Began with John Hartmann of IBM Denmark who offered Pipelines to an enthusiastic VM community**
- **Shipped with z/VM but an enhanced level is distributed at vm.marist.edu/~pipeline**





CMS Pipelines HELP PIPE TASK

- **Get information about CMS Pipelines**
- **Read or write records**
- **Get information about files**
- **Select or discard records**
- **Work with multiple records**
- **Manipulate data in records**
- **Reformat records**
- **Issue messages**
- **Interface with external environments**
- **Work with multiple streams**
- **Control the flow of records through the pipeline**
- **Buffer records to prevent stalls**
- **Write your own stage command**
- **Issue pipelines**
- **Build a filter package**





CMS Pipelines HELP PIPE MENU

<	CASEI	FILESLOW	Locate	PIPEPVR	SEVER	SYNChron
*CMS	CHANGE	FILEUPDA	LOOKUP	PIPESTOP	SHORT	TAKE
>	CHOP	FIND	MACLIB	PIPGFMOD	SNAKE	TAPE
>>	CMS	FMTFST	MAXSTrea	PIPGFTXT	SOCKA2IP	TCPCLIENT
?	COLLATE	FRLABel	MCTOASA	PIPINPUT	SORT	TCPDATA
:PIPE	COMBINE	FRTARGet	MDISKBLK	PIPLOCAT	SPECs	TCPLISTEn
ADDPiPE	COMMAND	FULLSCRe	MEMBERS	PIPOUTP	SPILL	TIMEstam
ADDSTREA	COMMIT	FULLSCRQ	MERGE	PIPSEL	SPLIT	TOKENIZE
AFTFST	CONFIGURe	FULLSCRs	MESSAGE	PIPSEVER	SQL	TOLABel
AHELP	CONSOle	GATE	NFIND	PIPSHORT	SQLCODES	TOTARGet
ALL	COPY	GATHER	NINSIDE	PIPSTRNO	STACK	UDP
APLDECod	COUNT	GETfiles	NLOCATE	PIPSTRST	STAGENUM	UNIQue
APLENCod	CP	GETRANGE	NOCOMMIT	PREDSELe	STARMONi	UNPACK
APPEND	CRC	HELP	NOT	PREFACE	STARMSG	UNTAB
ASATOMC	C14TO38	HOLE	NUCEXT	PRINTMC	STARSYS	UPDATE
ASMCONT	DATECONV	HOSTBYADD	OPTCDJ	PUNCH	STATE	URO
ASMFIND	DEAL	HOSTBYNAM	OUTPUT	QSAM	STATEW	VAR
ASMFIND	DEBLOCK	HOSTID	OUTSIDE	Query	STEM	VARLOAD
ASMPND	DELAY	HOSTNAME	OUTSTORE	READER	STORAGE	VCHAR
BEGOUTpu	DROP	IEBCOPY	OVERlay	READTO	STRASMF	VMC
BETWEEN	DUPLICat	IMMCMd	OVERSTR	RESOLVE	STRASMF	WHILELAB
BFS	ELASTIC	INSIDE	PACK	REVERSE	STREAMNU	XAB
BFSDIRECT	EMSG	INSTORE	PAD	REXX	STREAMST	XEDIT
BFSQUERY	ESCAPE	IP2SOCKA	PAUSE	REXXCMD	STRFIND	XLATE
BFSREPLA	FANIN	ISPF	PDSdirec	REXXVARS	STRFRLAB	XMSG
BFSSTATE	FANINANY	JOIN	PEEKTO	RUNPIPE	STRIP	XPNDHI
BFSXECUT	FANOUT	JOINCONT	PICK	SCANRANGe	STRLITe	XRANGE
BLOCK	FBLOCK	JUXTAPOS	PIPCMD	SCANSTRIn	STRNFIND	ZONE
BUFFER	FILEBACK	LDRTBLS	PIPCMDM	SCM	STRTOLAB	3270BFRA
BUILDSCR	FILEfast	LISTPDS	PIPCOMMT	SELECT	STRWHILE	3270ENC
CALLPIPE	FILERAND	LITERAL	PIPDESC	SETRC	SUBCOM	





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





Fullscreen CMS

CMS User's Guide, SC24-6009

```

Fullscreen CMS                Lines 17 - 33 of 35                Columns 1 - 79 of 81

      000D 2540  NOEOF CLOSED      NOKEEP NOMSG NONAME
      000D SUBCHANNEL = 0003
PRT  000E CL A NOCONT NOHOLD COPY 001    READY FORM STDN
      000E TO JELLIOTT PRT DIST JELLIOTT  FLASHC 000 DEST OFF
      000E FLASH      CHAR      MDFY      0 FCB      LPP OFF
      000E 1403  NOEOF CLOSED      NOKEEP NOMSG NONAME
      000E SUBCHANNEL = 0004
DASD 0120 3390 SYE711 R/O          250 CYL ON DASD  7035 SUBCHANNEL = 000C
DASD 0121 3390 USE70C R/O          84  CYL ON DASD  7001 SUBCHANNEL = 000D
DASD 0190 3390 RSE702 R/O          130 CYL ON DASD  8081 SUBCHANNEL = 0005
DASD 0191 3390 USP746 R/W          20  CYL ON DASD  73CE SUBCHANNEL = 0000
DASD 019A 3390 SYE7CM R/O          400 CYL ON DASD  730C SUBCHANNEL = 0008
DASD 019D 3390 US7E0K R/O          250 CYL ON DASD  801C SUBCHANNEL = 0007
DASD 019E 3390 SYE7CM R/O          400 CYL ON DASD  730C SUBCHANNEL = 0006
DASD 019F 3390 SYE7MD R/O          100 CYL ON DASD  73D6 SUBCHANNEL = 0009
DASD 01A1 3390 USC071 R/O          100 CYL ON DASD  330E SUBCHANNEL = 000B
DASD 0399 3390 USP749 R/O          30  CYL ON DASD  73E0 SUBCHANNEL = 000A

PF1=Help      2=Pop_Msg    3=Quit        4=Clear_Top   5=Filelist    6=Retrieve
PF7=Backward  8=Forward   9=Rdrlist    10=Left      11=Right     12=Cmdline
====>
09:41:01                Enter a command or press a PF or PA key
  
```





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

www.vm.ibm.com/perf

- **VM Performance Toolkit**
 - Provides enhanced capabilities for a z/VM systems programmer, system operator, or performance analyst to monitor and report performance data
 - Functions provided include:
 - Operation of the system operator console in full-screen mode
 - Management of multiple z/VM systems (local or remote)
 - Post-processing of Performance Toolkit for VM history files and VM monitor data captured by the MONWRITE utility
 - Viewing of performance monitor data using either Web browsers or PC-based 3270 emulator graphics
 - TCP/IP performance reporting
 - Also processes Linux performance data obtained from the Resource Management Facility (RMF) Linux performance gatherer, rmfpm





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 site packages

ibm.com/vm/download

- **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 site 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**
- ***Of course, not necessary with the VM Performance Toolkit***





SPOOLCHN

VM download site 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 site 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 site packages

- **From Mike Cowlshaw, 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 site packages

Document: LEXX TESTFILE V1 At: "Friends, "... 15:58
Command:

```
Friends, Romans, countrymen, lend me your ears;  
I come to bury Caesar, not to praise him.  
The evil that men do lives after them,  
The good is oft interred with their bones;  
So let it be with Caesar. The noble Brutus  
Hath told you Caesar was ambitious;  
If it were so, it was a grievous fault;  
And grievously hath Caesar answer'd it.  
Here, under leave of Brutus and the rest, --  
For Brutus is an honourable man;  
So are they all, all honourable men, --  
Come I to speak in Caesar's funeral.  
  
Julius Caesar, III.ii.79
```

PF1 Help PF2 Opencl PF3 Quit PF4 Copy PF5 Move PF6 ?
PF7 Up PF8 Down PF9 = PF10 Select PF11 Splitj PF12 Focus

30 | SHARE 102 - Session 9212 2004-02-27





LEXX Live Parsing Editor - additional packages

VM download site packages

Package name	Description
LEXXPLXX	Parsers for PL/I, PL/X, Modula-2 and Pascal
LEXXASM\$	Parser for Assembler
LEXXC\$\$	Parser for C
LEXXCFDA	"Commands From Data Area" facility
LEXXCOB\$	Parser for COBOL
LEXXFOR\$	Parser for FORTRAN
LEXXRX\$\$	Alternate parser for REXX
LEXXTEX\$	Parser for LaTeX/TeX Parser
LXFINDT	FIND Token command
LXJCL\$	Parser for MVS JCL
LXPRMPT	Prompt command





Tools/information on the Internet

- **TXT2PDF - Convert a text file to a PDF**
- **Internet discussion lists**





TXT2PDF

www.homerow.net/rexx/txt2pdf.htm

- **The TXT2PDF utility is used to convert a text file into a Portable Document Format (PDF) file**
- **It has many options to control the conversion, output appearance, and final presentation. Some of the features include:**
 - Annotations
 - Outline generation
 - Color control
 - Several background options
 - Viewer control





Internet discussion lists

www.vm.ibm.com/techinfo/listserv.html

■ **VMESA-L**

- The VM Discussion list is an ideal place to ask a question of your VM peers
- To subscribe, send a note to listserv@listserv.uark.edu
 - SUBSCRIBE VMESA-L your name
- listserv.uark.edu/archives/vmesa-l.html

■ **LINUX-390 discusses Linux on IBM Mainframe**

- Linux on zSeries, Linux for S/390 and Linux running as a VM guest
- To subscribe, send a note to listserv@vm.marist.edu
 - SUBSCRIBE LINUX-390 your name
- www.marist.edu/htbin/wlvindex?linux-390





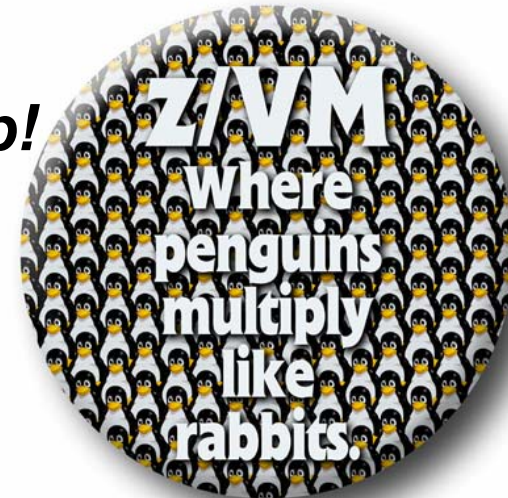
Managing Linux Using 'Hidden' Tools in z/VM

- There are a great many tools and sources of information available to z/VM users
- They may be hard to find, but they are out there
- Use the VMESA-L list to ask questions
- ***Don't be afraid to ask for help!***

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