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# Are There Free Tools to Use on my z/VM System?

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# Agenda

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- Where do you find free tools?
- How about support?
- Getting tools from a web site to your z/VM system
- Essential Tools
  - Pipelines
  - VMARC
  - TRACK
- Tools for:
  - System Programmers
  - Working with Linux
  - Service Machines
  - Programming
  - Tools for CMS
  - Other

# Where do you find free tools?

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## These sites have the majority of download options

- z/VM downloads page
  - <http://www.vm.ibm.com/downloads> has background information, license agreement, etc.
  - <http://www.vm.ibm.com/downloads/packages> has the list of packages
  - 476 packages currently (1 added this week!)
- VM Workshop tools page
  - <http://www.vmworkshop.org/tools>
  - Multiple pages of tools, some modern, some old.
- Sine Nomine Associates VM tools page
  - <http://www.sinenomine.net/vm/products>
  - Multiple pages of tools, some free, some for sale
- Pages hosted by vm.marist.edu
  - Pipelines: <http://vm.marist.edu/~pipeline/>
  - Track: <http://vm.marist.edu/track/>

# Where do you find free tools?

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## A few other sites I have found

- Slippery Rock University
  - <http://zvm.sru.edu/~DOWNLOAD/> (also migrated to vmworkshop.org)
- Homerow.net
  - <http://homerow.net/>
  - Tools such as smcli (SMAPI command line tool), VMA to read VMARC files
- Dave Jones
  - <http://www.vsoft-software.com/>
  - (Wasn't working correctly last I checked, moved to vmworkshop.org?)
- Sourceforge
  - Zoom systems management tool (<http://sourceforge.net/projects/system-zoom/>)
- Samples included with z/VM
  - Drawlogo exec on CP samples disk
  - Spoolaid package on RSCS samples disk
  - See this presentation from Rick Barlow about several VM “goodies”:
    - <http://linuxvm.org/present/SHARE112/S9153rb.pdf>

# Support?

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- Well, no, usually not anything official
  - Although there are exceptions
- Usually “best effort” basis by the author
  - If the author is still around!
- Options
  - Self support
  - Community support
  - Alternative tools
  - Supported products
- Some questions to ask:
  - How critical is this tool to your business?
  - Do you have the skills to support it yourself?
  - OK, it works great now, but will it have problems on a future release or future environment?
  - Should you be migrating to a supported product?

## Can you support it yourself?

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- What language is it written in?
  - Interpreted, like Rexx?
  - Assembler?
  - Other high level language
  - Is the source code included?
- If compiled or assembled, do you have that software?
  - For assembler, do you need high level assembler or can CMS's Assembler F work?
- How well is it documented?
  - Is there a document or help file included?
- Do you have the skills to fix or improve it?
  - Rexx is “easy”, sure, but some Rexx code can be pretty complicated to figure out.
  - CMS Pipelines?
    - How much is used
    - Do you have the skills to change or update it?

## Other Inhibitors

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- Restrictions on what software can go on your system
  - Restrictions on where code comes from (i.e. non-product code.)
  - Code review
  - Sandbox vs. production systems
- Difficulties downloading and/or uploading
  - Restrictions on what can go on your workstation
  - No connection from VM to the internet
  - Don't know how to do it correctly
- The Chicken and Egg problem, which comes first?
  - Where do I get VMARC?
  - How do I download VMARC and make it a usable module?
  - The VM downloads page has VMARC and instructions for downloading
    - Hold on for more details!
    - It also links to a version that runs on Windows, Linux, and even z/OS! <http://homerow.net/zvm/vma/>

# Pipelines on CMS

- Many tools use Pipelines in REXX execs
    - A very essential tool to have in your toolbox!
    - Replaces many old REXX functions and utilities
    - What would programming on CMS be without it?
  - You should understand the 2 different levels
- 
- Pipelines is a standard part of CMS
    - Usually this is called CMS Pipelines, built in Pipelines, or Endicott Pipelines
    - Or terms like copper plumbing, indoor plumbing, etc. Not antique, but maybe a bit dated.
  - The most up to date is the Runtime Library found on the Marist site
    - Called Marist pipes, Princeton pipes (for where it used to be hosted), or uplevel pipes
    - Or terms like plastic pipes and modern plumbing. The most up to date available!
    - <http://vm.marist.edu/~pipeline/index.html>
  - The Marist site has a lot more than just the code
    - Manuals, hints, tips, education, white papers
    - Many code samples, complete packages, and extensions.



# The PICKPIPE tool

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- This is the suggested tool for loading the Runtime Library or downgrading to CMS Pipelines
  - Found on the VM Downloads page, referenced on the Marist Pipeline page
  - <http://www.vm.ibm.com/download/packages/descript.cgi?PICKPIPE>
  - Help file included in the package
- Usage:
  - PICKPIPE Uplevel - Load the runtime library level (PIPELINE MODULE)
  - PICKPIPE Cms - Load the built in CMS level (DMSPIPE MODULE)
  - PICKPIPE Test - Load a test level (NXPIPE MODULE)
  - PICKPIPE Query - Show what level and type is loaded
- Other features
  - Using a shared segment for the Pipeline code
  - Setting the Pipeline style (configuration variables)
  - Stacking (push) a new level or purging (pop) the current level (or all levels)

## Downloading tools (continued)

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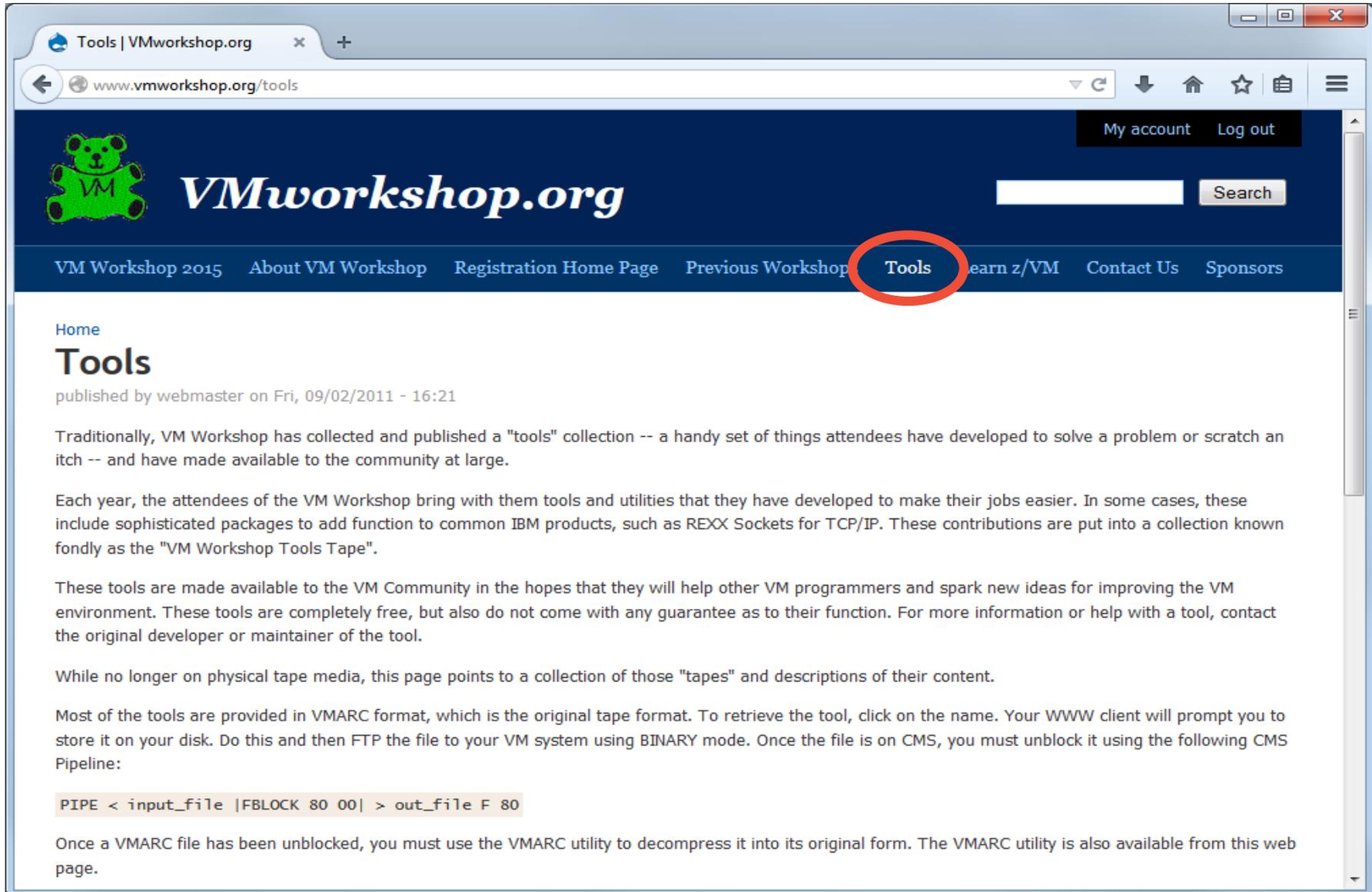
- Now, back to downloading tools
- Pipelines has stages that can help you with your uploaded data
  - Converting files to fixed record format
  - Converting files back to CMS record format
  - Which one you use depends on what you downloaded
- Downloading VMARC MODULE from the VM downloads page
  - Go to <http://www.vm.ibm.com/download/vmarc.module> and save the file
    - Or more likely: Go to <http://www.vm.ibm.com/download> and right click “here” and “save as” the file
  - Upload that file from your PC to VM in binary. It will create (by default) a variable length format file.
  - Use Pipelines to reformat the file:
    - PIPE < VMARC MODULE A | deblock cms | > VMARC MODULE A
    - If you changed the uploaded file name or put it on a different disk, use the correct name
  - Why does this work on this file?
    - When the VM web server hosting the VM site downloads a module, it adds a 2 byte record length to the front of each CMS record. “deblock cms” uses that length to recreate the records.

# The VMARC tool

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- VMARC is a data compaction and file archiving utility for CMS
  - Originally written by John Fisher of RPI with updates by others
- VMARC archives are formatted Fixed 80 byte records
  - When you upload, specify Fixed 80 format and **binary**
    - From a PC to VM: enter “site fix 80” or “quote site fix 80”
    - From VM to an FTP server: enter “binary F 80”
  - Or – reformat the file after uploading
    - PIPE < tool upload a | fblock 80 00 | > tool vmarc a fixed
- To unpack the archive:
  - All files to your A disk: vmarc unpack tool vmarc a
  - All files to a different disk, such as Z: vmarc unpack tool vmarc a = = z
  - Other options: VMARC ?
    - Also download the HELP file from <http://www.vm.ibm.com/download/vmarc.helpcms>
      - Process it with PIPE < vmarc helpcms a | deblock cms | > vmarc helpcms a

# vmworkshop.org/tools



The screenshot shows a web browser window with the address bar displaying `www.vmworkshop.org/tools`. The page header features the VMworkshop.org logo (a green bear with 'VM' on its chest) and the text 'VMworkshop.org'. To the right of the logo is a search bar and a 'Search' button. In the top right corner, there are links for 'My account' and 'Log out'. The navigation menu below the header includes links for 'VM Workshop 2015', 'About VM Workshop', 'Registration Home Page', 'Previous Workshop', 'Tools' (circled in red), 'Learn z/VM', 'Contact Us', and 'Sponsors'. The main content area has a 'Home' link and a large 'Tools' heading. Below the heading, it says 'published by webmaster on Fri, 09/02/2011 - 16:21'. The text describes the 'tools' collection as a handy set of things attendees have developed to solve a problem or scratch an itch, and are made available to the community at large. It also mentions that these tools are completely free but do not come with any guarantee. At the bottom, it provides instructions on how to retrieve the tools in VMARC format and includes a sample command: `PIPE < input_file |FBLOCK 80 00| > out_file F 80`.

## Tools from vmworkshop.org

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- Don't forget that you can submit your tools to vmworkshop.org!
  - <http://www.vmworkshop.org/tools/submit-a-tool>
- Be sure to look under “VM Tools from Other Sources”
  - <http://www.vmworkshop.org/node/45>
  - Many tools found in the “Developer Pages” section
    - <http://www.vmworkshop.org/node/63>
  - More tools found on the “Tools from the Net” page
    - <http://www.vmworkshop.org/node/46>
- The VM Workshop has been collecting tools for many years
  - Be sure to visit the “Past VM Workshop Tools Tapes” page
    - Thankfully, the tools don't have to be read from tapes!
    - <http://www.vmworkshop.org/node/51>
  - Tools from workshops 1985-1988, plus recent workshops starting in 2012.

## So – More than 500 tools – how to talk about them?

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- I put the tools into a few categories:
- System Programmer tools
  - Help you manage your system
- Working with Linux
  - Tools to work with disks
- SVM (Service Virtual Machines)
  - These run in a disconnected user
- Programming tools
  - Functions, utilities, screen drivers, examples, etc.
- CMS tools
  - For any CMS user, privileged or not
- Other
  - Linux interface, product add-ons and mods, performance tools, and more

## System Programmer tool – TRACK for VM

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- As it says on its web page “The one tool you can’t live without!”
  - It is certainly a tool a VM system programmer shouldn’t live without!
  - Find it at <http://vm.marist.edu/track/>
- It allows you to see what another virtual machine is doing
  - Spooled console
  - Recent commands
  - Virtual device details
  - Current state
  - Control blocks
  - Virtual and Real Storage
- Very handy to look at the console of a disconnected user
- Any screen can be put into auto-refresh mode

## TRACK, default screen

```
z/VM [24 x 80]
TRACK 1 USER : OPERATOR      ****  VMD  ****  z/VM 6.3 1401  17:22:45 05/11/15
=====
VMDBK @ 019D0000      Class  = ABCDEFG      Share= 100  R
Logon= 02/25/15 10:44  Virtcpu = 000:00.00  Totcpu = 000:00.07  11  Devices
Storage=      32M      Account = IBMDFLT  Console= DISC
Last CP= CLOSE      Locked= 0      Resident= 144      WSS= 144
PSW= 030E0000 8105B158      CC = 0      Stat  = EC ENABLED  WAIT SUPR
CPUaddr= 00  #CPUs= 01  Mach= ESA      Amode= 31-bit      370accom= OFF
Sio= 30      Pr= 2178      Pun= 0      Read  = 0      Dist = OPERATOR
Rstat=
Qstat= IABIAS
Ostat= SYSOP IN-USERCT DISC
Com = DISC      Exec = PROFILE  Mod = IMMCMD      Tran= SYNONYM
Ipl = IPL CMS PARM AUTOCR
R0-7= 00000000 0000A094 C3D6D5F1 00001378 00000000 00000000 00000028 00000000
R8-F= 0000026C 000047A8 00000028 00004F50 0105B060 0000A668 81055BBA 0105B060
disc | xautolog tools |

=====
CR=Upd CLEAR=Subset ==> _
2=Auto 3=Quit 4=Prt 5=File 1=RST 9=VMD 10=VST 11=DEV 12=DBK 7=Prev 8=Next
MA E 22/026
```

## TRACK, console display

```
z/VM [24 x 80]
TRACK 1 USER : OPERATOR      ****  CON   ****  z/VM 6.3 1401  17:24:48 05/11/15
=====
 1 00:02:00 CON FILE 0399 SENT TO   LOGS      RDR AS  6009 RECS 0026 CPY  001 T
    NOHOLD NOKEEP
 2 DVHBCK3871I Disk backup processing started.
 3 DVHBCK3872I Disk backup part 1 completed.
 4 DVHBCK3872I Disk backup part 2 started.
 5 DVHBCK3873I Disk backup processing completed.
 6 00:14:17 * MSG FROM PERFSVM : FCXPMN444E IUCV reply failed with reason cod
    e 9
 7 00:15:00 HCPCRC8064I Recording data retrieval has been started; recording *
    ACCOUNT for userid DISKACNT.
 8 17:22:38 GRAF L0004 LOGON AS  MAINT630 USERS = 31      FROM 9.65.106.168

Top of console buffer=====
CR=Upd CLEAR=Subset ==> _

2=Auto 3=Quit 4=Prt 5=File   1=RST 9=VMD 10=VST 11=DEV 12=DBK   7=Back 8=Forward
MA  E                                                                    22/026
```

# System Programmer Tools

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- Managing the spool and spool space

- SPOOLPIG – Display the largest spool files and users of spool on a system
  - Basically CP QUERY of all spool files and sort the result. Written in Pipelines.
- SPOOLCHN – System Programmer extended spool query commands
  - Digs through control blocks and diag output. Written in Assembler and may require privileges.
- SPOOLAID – Full screen browser of spool file internals (included as an RSCS sample)
  - Shows contents of spool files, read using standard diagnose calls. Combination of Assembler and Rexx
- SPFPACK – Determine which spool files have data on a particular spool pack
  - Very handy when migrating spool packs. Written in Rexx, also requires RXDASD package
- Don't forget: SFPURGER – CMS utility to clean up spool files
  - Part of CMS, so supported and documented!

- Managing the directory

- DRM – An XEDIT based interface to manage the CP Directory
  - An extensive set of tools. Written in Rexx, interfaces with other tools by the same author (Kris Buelens)
- DR\_DRCT – Directory fix-it tools. Move/expand DRCT space, find CMS minidisks and more
  - As it says, does many things. Written in Rexx
- DIRENT – Extracts entries from the object directory (last updated for VM 5.2)
  - If you lost the source directory, it may help, but not updated recently. Written in Rexx, requires XASTOR MODULE also.
- QDIR – A utility to replace the DIRMAINT GET command
  - Really more than this, including full screen displays. Rather old, written in Rexx, I don't know if all of it still works.

# System Programmer Tools

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- DASD and device tools

- QDASD – Display information about DASD devices in table form
  - Uses CP commands to query information to output. Written in CMS pipelines.
- EDEVPATH – FCP path management tool for EDEVs
  - Helps remove and restore channel paths from all EDEVs, and get a snapshot. Written in Rexx
- QRYWWPNS – Find out which FCP and WWPNS can reach a given LUN
  - Processes SCSIDISC output to find the LUN. Written in Rexx
- MDSK – A few Minidisk related tools and DEFINE MDISK aids
  - Mostly to assist with DEFINE MDISK, there is also a query. Written in Rexx and Pipelines
- EDCKD – A tool to display and/or alter records on any CKD DASD
- EDFBA – Displays and/or alters blocks on FBA DASD
  - Interesting tools, and you should be careful! Full screen, XEDIT based, self-creates its own program.
- PIPEDDR – Dump/Restore a disk to a file, ftp server, or over TCP/IP to a remote system.
  - Can be used for backups, or for binary disk copy to a remote system. Written in Rexx and Pipelines

- Managing your system

- SESTOOLS – Tools to make working with VM/SES easier
  - Many tools to help you work with VMSES and service. Written in Rexx
- VIR2REAL – Compute the Virtual to Real storage ratio of running users in a VM LPAR
  - Shows the ratio of memory of all logged on users to the LPAR memory. Written in Rexx and Pipelines
- CMDTABLE – Generate a table listing all defined CP commands and classes
  - Very helpful if you create new CP command classes. Written in CMS Pipelines

# System Programmer Tools

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- And many others
  - Tools to help you with SFS
    - SFSKTOOL – Various tools related to SFS management
    - SFSULIST – Lets you handle SFS users in a FILELIST like way
    - NONAMES – Avoid NAMEFIND lookup for SFS administrative commands
    - ERALIAS – An exec to remove ERASEd ALIASes from the SFS catalog
  - SFS tools that are already on the MAINT 193 disk:
    - WHO EXEC – sort and display users enrolled in SFS
    - TALLY EXEC – Show allocated and free space
    - SFSTRANS EXEC – Transfer ownership of files and directories from one user to another
    - REGRANT EXEC – Regrant file and directory auths if a user id is changed
  - Cloning and system changes
    - RENSSI – Rename a member of an SSI
    - CLONE620 – Create an IPLable copy (CLONE) of the running ZVM 6.2 system
  - And ..
    - SCIF – Easier "talking" to SCIFfed users (avoid the CP SEND command)

# Tools to help with Linux

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- Tools from Sine Nomine Associates



- SWAPGEN – Format a Linux swap disk under CMS

- Especially useful to format a VDISK
  - Find it at <http://www.sinenomine.net/products/vm/swapgen>
  - This tool is recommended by many people, redbooks, mailing list entries, and so on
  - Example of how to use it:
    - In a PROFILE EXEC run on a Linux user id before IPLing Linux itself, define a 512 MB swap disk
    - 'EXEC SWAPGEN 300 1048576'
    - Note that the block size is 512 bytes, so you need more than a million of them for 512 MB.

- LXFMT – Format and partition a Linux disk from CMS.

- Recently updated to correctly handle large disks, included Extended Address Volumes (EAV)
- Find it at <http://download.sinenomine.net/lxfmt/>
- If you would like to give a Linux server a new disk that has already been formatted:
  - Format disk 150 fully (-F) and show progress messages (-M)
  - LXFMT 150 (-F -M)

# Service Virtual Machines (SVMs)

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- Tools to help you build your own servers
  - VMSERVE – A disconnected virtual machine manager, handles timed events, files
    - Configurable for timed events, spool files, and messages. Based on WAKEUP
  - RXSERVER – A kernel to build REXX WAKEUP servers, such as VMUTIL
    - Other packages that support RXSERVER:
      - CHKSERV to manage RXSERVER servers, ADDON to add wakeup commands
- Tools for specific functions
  - VMLOGS – Create an automatic managed repository for Consoles and data files
    - WAKEUP based, also has configuration for SFPURGER
  - CONCLOSE – An exec to close all or selected consoles/prints at midnight
    - Doesn't wait for midnight on its own, but helps close all the consoles
  - YVETTE – Provide multiple sessions to dialed 3270s
    - You DIAL YVETTE, and it can create multiple logon sessions. Old, but still works
  - TOOLSRUN – Disk/Conference manager
    - Also packages TOOLS, TRSOURCE, and TOOLSDOC
    - Allows replication of updates to a local disk to remote systems via RSCS connections
  - SYSLOGD – daemon for CMS
    - Listens to port 514 and logs to a CMS file
  - CHUG – Script driven test tool with HTML output and near-total control of test UserID
    - Also CHUGDEMO. Used by VM system test, so a lot of function and many ways to configure it

## Service Virtual Machines – IPGATE

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- IPGATE means IP Gateway, providing CP resource sharing over IP
  - Allows many (but not all) CMS applications that use APPC connections (like SFS and Performance Toolkit) to communicate between VM systems.
    - Otherwise, VTAM or CTC connections are required
  - Originally written by Holger Woller as part of a CMS multitasking Redbook
    - *Exploiting Recent CMS Function: A User's Guide to CMS Application Multitasking*, November 1998
  - More recent updates by Dave Jones and available via [vmworkshop.org](http://vmworkshop.org)
    - <http://www.vmworkshop.org/node/368>
    - <http://www.vmworkshop.org/sites/www.vmworkshop.org/files/ipgate.vmarc>
  - You'll need to read the chapter in the Redbook to set it up (Chapter 4)
    - <http://www.redbooks.ibm.com/abstracts/sg245164.html?Open>
    - You decide which resources are shared, which users have access, etc.

# Programming tools

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- These tools help you write your on programs
  - Utilities that help you use VM functions
    - TIMEBOMB – Set, snooze, or cancel the CP timebomb (diag 288) feature from CMS
    - SHUTTRAP – CMS program to detect and react to CP SHUTDOWN signals
    - DIAG00E4 – Diagnose E4 CSL routine. Get minidisk information, create an overlay
    - CPLINKPW – Avoid CP READ when linking to a minidisk
    - D26C – Interface to Diagnose 26C. Written in C, source code included. (New this week)
  - Rexx function packages and Rexx interfaces
    - XMLPARSE – Parse XML document into a tree structure easily processed by Rexx
    - IOS3270 – Write full screen 3270 applications
    - REXXIUCV – IUCV interface for Rexx
    - CUA2001 – Allows development of Common User Access (CUA) panels for 3270 terminals
    - MTREXX – CMS MT ThreadCreate function for Rexx
    - RXDASD – Dasd I/O as a Rexx function
    - RXDISP – Rexx display utility
    - RXFLOW – Rexx function to reflow/justify text or to separate sentences
    - RXTAPE – API to issues commands to a tape device

# Programming tools

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- Pipelines interfaces

- PUTFILES – Converse of the GETFILES Pipelines stage
- EMAIL – Pipelines SMTP Protocol EMAIL stage
- COMPUTE – REXX mathematics for each record in a pipeline
- FTP – FTP client stage for Pipelines (Found on Pipelines Runtime Library page.)
- NETDPIPE – pipe stage to handle NETDATA stream; Pipeline SENDFILE/RECEIVE
- Plus many more on the Pipelines page: <http://vm.marist.edu/~pipeline/index.html>

- Interface to FTP

- VMFTP – a macro processor for the VM FTP client
  - Allows a Rexx program to issue FTP client commands and process the responses
  - Useful for automating FTP transfers
  - From the sru.edu page or vmworkshop.org
  - <http://zvm.sru.edu/~DOWNLOAD/VMFTPUPD.VMARC>
  - <ftp://www.vmworkshop.org/sru/VMFTPUPD.VMARC>

## Tools for CMS

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- There are many tools that help you with your CMS environment, provide enhanced function, help you work with files, enhance XEDIT, etc.
- Working with files
  - COMPARE – Compare files with XEDIT, compare minidisks or filelists
  - LISTSG – A series of FILELIST like tools
  - FILELIST – Improvements to FILELIST, RDRLIST, and EXECUTE
  - SETDATE – Set the date of last update on CMS or SFS files
  - BFSLIST – List a BFS filespace in a FILELIST/DIRLIST like way
- Editing files and working with XEDIT
  - LEXX – Live Parsing Editor. This is an extensive editor not based on XEDIT
  - PF10PF11 – XEDIT macros that move left or right based on the cursor position
  - GD-XEDIT – Various XEDIT goodies from Kris Buelens (79 files in the VMARC!)
  - XCOL – XEDIT column editing. Like a prefix area for columns instead of lines
  - SRCHLIST – A SEARCH XEDIT macro that searches files from FILELIST or MACLIST
  - COLSIMPL – Column insert and delete simple XEDIT macros

## More tools for CMS

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- General CMS tools

- OTTOSCR – Screen scroller for Fullscreen CMS
- HISTORY – Display the CMS command history file (maintained by OTTOSCR)
- RETBUF – Full screen CP retrieve buffer selection panel
- VMMENU – Easy selection menu presentation for CMS
- RECOVER – Recover a wrongly erased file or attempt to recover a corrupt disk
- SHOW (or SHOWFILE) – Show CMS files or spool files read only.
  - Much more extensive than BROWSE and doesn't load the entire file like XEDIT
  - Available on the VM Workshop site: <http://www.vmworkshop.org/node/250>
  - Or from <ftp://www.vmworkshop.org/sru/SHOW.VMARC>

- Text processing tools

- B2H – Convert files to HTML. Source can be Bookmaster/Script, GML or text files
- H2S – Convert HTML to Script for printing with AFP or postscript
- BOX2BMS – Draw box diagrams for Bookmaster documents
- RRTGEN – Create text railroad track syntax diagrams from syntax files

## Working with Performance data

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- These tools work directly with raw monitor data (MONWRITE)
  - MONRIP – Extract time-range data from a monwrite file
  - CPUMF – Report on D5 R13 MRPRCMFC CPU measurement facility counters
  - MONCLEAN – Clean up MONWRITE disk of monitor files
  - MONVIEW – Helps you look at raw monitor data records or input to other programs
  - TSLAMON – Connect to monitor in real time and report on %CPU and %WAIT
- Also, some tools that work with Perfkit
  - PTKTOOLS – Some simple execs and control files for Perfkit
  - PRFIT – Wrapper to invoke PERFKIT BATCH
  - FCXRENAM – Sample FCXRENAM EXEC to archive performance log files

## And....?

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- What tools did I miss?
- What are your favorite tools?
- Let me know for a future update!

The End

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Thank you for listening!

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