Are There Free Tools Available for z/VM?

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Agenda

— Where do you find free tools?

— How about support?

— Getting tools from a web site to your z/VM system

— Essential Tools
  • Pipelines
  • VMARC
  • VMLINK
  • TRACK

— Tools for:
  • System Programmers
  • Working with Linux
  • Service Machines
  • Programming
  • Tools for CMS
  • Other

Where do you find free tools?

These sites have the majority of download options

— z/VM downloads page
- http://www.vm.ibm.com/download/ has background information, license agreement, etc.
- http://www.vm.ibm.com/download/packages/ has the list of packages, download link, and links to the descriptions
- 490 packages currently

— VM Workshop tools page
- http://www.vmworkshop.org/tools.shtml
- Multiple pages of tools, some modern, some old.

— Sine Nomine Associates VM tools page
- https://www.sinenomine.net/vm/products
  o Multiple pages of tools, some free, some for sale
- http://download.sinenomine.net/vmses/
  o SES-Installable VM Package Files

— Pages hosted by Marist College at vm.marist.edu
- Pipelines: http://vm.marist.edu/~pipeline/
- Track: http://vm.marist.edu/track/

Where do you find free tools?

A few other sites I have found

— Slippery Rock University
- Migrated to vmworkshop.org: http://www.vmworkshop.org/HENSLER/

— Homerow.net
- http://homerow.net/
- Tools such as smcli (SMAPI command line tool), VMA to read VMARC files, TXT2PDF to create PDFs

— Cullen Programming
- http://cullenprogramming.homelinux.com/
- Both free and paid versions of a few unique tools.

— Sourceforge, Github
- Zoom systems management tool (https://sourceforge.net/projects/system-zoom/)
- Pipelines zlib compression stage (https://github.com/jphartmann/cmslib-exec.git)

— Samples included with z/VM
- Drawlogo exec on CP samples disk and Spoolaid package on RSCS samples disk
- See this presentation from Rick Barlow about others: http://linuxvm.org/present/SHARE112/S9153rb.pdf

Support?

— Well, no, usually not anything official, although there are exceptions

— Usually "best effort" basis by the author, if that author is still active in the z/VM community

— Options
  - Self support
  - Community support
  - Alternative tools
  - Supported products

— Some questions to ask:
  - How critical is this tool to your system and 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?

— What language is it written in? Interpreted such as Rexx or binary such as Assembler?

- Or some other high level language?
- Is the source code included? In some cases it isn't, although I hope this is rare.

— If compiled or assembled, do you have the compiler or assembler required?

- 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? How complete is it and how understandable?

— 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.
    - Thankfully Rexx has good tracing facilities
- CMS Pipelines?
    - How much is used? Simple or complicated plumbing?
    - Do you have the skills to change or update it?

Other Inhibitors

— Are there 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?

- Most tools are packaged with VMARC, where do I get it?

- How do I download VMARC and make it a usable CMS module?

- The VM downloads page has VMARC and instructions for downloading (I'll have details later)
  - It also links to a version that runs on Windows, Linux, and even z/OS! http://homerow.net/zvm/vma/

Pipelines on CMS in z/VM 6.4 and z/VM 7.1

— 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 modern programming on CMS be without it?

— Pipelines is a standard part of CMS

- Prior to z/VM 6.4, it had not had major updates for about 20 years.
- Now you can use all of the new function on your system without an internet download!
- The 6.4 level included these missing updates, enhancements, and more, along with support.

— The RITA Pipelines Execution Profiler is still included with z/VM

- Find it as RITA MODULE on MAINT 193; Replace your PIPE command with RITA
- Your pipeline runs and a report on CPU utilization by stage is created at the end.
- Read more about it: http://vm.marist.edu/~pipeline/rita.html

Pipelines Runtime Library

— This was the place to go to download the latest level
  - http://vm.marist.edu/~pipeline/index.html
  - Maintained by John Hartmann, the author of Pipelines
  - The current library version is very close to the CMS version
  - There are just a few known bugs, listed on that page.

— This site has a whole lot more than just the runtime library

  - There are manuals, how-to documents, hints, tips, education, code samples, and extensions
  - The white papers are still the best reading to learn about programming in pipelines.

— Some terminology:

  - Terms about the Runtime Library found on the Marist site:
    o Called Marist pipes, Princeton pipes (for where it used to be hosted), or uplevel pipes
    o Or terms like plastic pipes and modern plumbing. This is what is part of z/VM 6.4.
  - The older CMS version on z/VM 6.3 and prior releases:
    o Sometimes called copper plumbing, indoor plumbing, etc. It was a bit dated, but not antique.
  - Extremely old versions were referred to as lead plumbing.

The PICKPIPE tool

— 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
- A Help file is part of the package
- Not really needed anymore with Pipelines on z/VM 6.4 (but tools may still reference it.)

— Usage:

- PICKPIPE Uplevel   - Load the runtime library level (PIPELINE MODULE)
  On z/VM 6.4 and later, Uplevel is a synonym for CMS

- 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)

— 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

— 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

Installing Tools

— Is there a standard place? No, not really.
  o Create a user ID, such as TOOLS, to own a public minidisk.
  o Some <u>could</u> go on the Y disk, but generally this is not recommended. Some exceptions would be OK.
- Some tools have specific installation instructions, locations, and usage.
- Many are just one or two files, which just need to be found in your CMS search order.
- What if you have multiple systems? How do you keep all systems in sync?
  o The "tool" you could use is TOOLSRUN, shown later.
  o An SFS filepool shared by all systems is another solution.

— A new solution: **z/VM SES-Installable VM Package Files**
- Find them at http://download.sinenomine.net/vmses/
- Uses the power of VMSES/E to install and manage your VM tools. Install tools to SFS or minidisks.
- You first install the ZZY00000 infrastructure package from this page
  o It has you set up a separate SFS filepool and user IDs to manage your tool inventory separate from any products.
  o You can choose to install each tool to the SFS filepool or to minidisks.
- After the infrastructure package is in place, installing more of the tools is pretty easy.
- There are currently 11 tools on this web page. Let me know if your favorite tool should be included.

And now, a word from our sponsor – The VMLINK command

- VMLINK is not a tool, but a CMS command. (It was originally an internal IBM tool.)

- It has functions to help system programmers, end users, and tool writers
    - It can access both minidisks and SFS directories
    - It can do multiple accesses in 1 call
    - You can create a names file to easily access system disks
        - VMLINK TCPIP, for example to access TCPMAINT 592
    - If you have a names file defined, entering just VMLINK shows a list of the entries

- It is documented in the CMS Command Reference and the CMS User's Guide
    - More details on creating a NAMES and CONTROL file are in the User's Guide

- Create VMLINK NAMES to define the nicknames. Put it on the Y disk for the whole system

```
:nick.TCPIP             :product.TCPMAINT 592
                        :category.SYSTEM
                        :title.TCP/IP Client disk
:nick.TOOLS             :product.TOOLS 192 <* T-Z>
                        :category.TOOLS
                        :title.Common tools disk
```

VMLINK examples

- For tools, it will find free file modes, access disks, and help you get to data
  - For instance:

```
/* Check config syntax */
'EXEC VMLINK PMAINT CF0 (NONAMES WRITE PUSH .FM STEM VMLINK.'
If RC<>0 then Exit RC
Parse var vmlink.1 '.FM' config_fm .
'EXEC CPSYNTAX SYSTEM CONFIG' config_fm
'EXEC VMLINK PMAINT CF0 (NONAMES WRITE POP'
```

- One of my favorites – to update a file, such as PROFILE EXEC on AUTOLOG1 191:
  - Use the WRITE and FILELIST options of VMLINK (abbreviated W and FI here)
  - **VMLINK AUTOLOG1 191 (W FI**
    - DMSVML2060I AUTOLOG1 191 linked M as 0120 file mode Z
  - Select the file to edit, or whatever you need to do
  - Press F3, and you leave Filelist, plus the disk is released and detached
    - DMSVML2061I AUTOLOG1 191 detached
  - Note: I didn't specify the NONAMES option, but if I put the command in an exec, it should be included.

More than 500 tools!

— To classify them, I put the tools into a few categories:

— System Programmer tools
  • Help you manage your system, perform enhanced queries, and other hard to find things.
— Working with Linux
  • Tools to work with disks
— SVM (Service Virtual Machines)
  • These run in a disconnected user and can perform a wide variety of tasks.
— Programming tools
  • Functions, utilities, screen drivers, time savers, examples, etc.
— CMS tools
  • For any CMS user, privileged or not
— Other
  • Linux interface, product add-ons and mods, performance tools, and more

— Note: **All tools are found on the VM downloads page unless stated otherwise**

System Programmer tool – TRACK

— 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=                                    Last activity on 03/18/15 00:13:49
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

— Managing the spool and spool space

- SPOOLPIG – Display the largest spool files and blocks used by user of the 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 though 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!

  See the downloaded presentation for examples on how to use it.

— 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

— 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

System Programmer Tools

— Managing your system
- o SESTOOLS – Tools to make working with VM/SES easier
  Many tools to help you work with VMSES and service. Written in Rexx

- o VIR2REAL – Compute the Virtual to Real storage ratio of running users in z/VM
  Shows the ratio of memory of all logged on users to the LPAR memory. Written in Rexx and Pipelines

- o CMDTABLE – Generate a table listing all defined CP commands and classes
  Very helpful if you create new CP command classes. Written in CMS Pipelines

- o SSIQSERV – Query and compare the CP service on all SSI members (new)
  Issues QUERY CPSERVICE on each SSI member and show what's missing. Written in CMS Pipelines

— Managing guests
- o SCIF – Easier "talking" to SCIFfed users (avoid the CP SEND command)

— Searching an unknown disk
- o QLABS – List volume and CMS labels found on a formatted disk
  Find it at http://www.vmworkshop.org/qlabsexe.shtml

- o WOMYD – "What's on my disk" – The function of QLABS plus more, showing CMS files and vtoc entries also
  Find it at http://www.vmworkshop.org/misctool.shtml

System Programmer Tools

— 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 z/VM 6.2 system

Tools to help with Linux

— 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, including Extended Address Volumes (EAV)
  - Find it at http://www.sinenomine.net/products/zvm/cms-tools/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)

— 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

- 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

— IPGATE means IP Gateway, providing CP resource sharing over IP links

- Allows many (but not all) CMS applications that use APPC connections (like SFS and Performance Toolkit) to communicate between VM systems.
  - o Otherwise, VTAM or CTC connections are required
- Originally written by Holger Woller as part of a CMS multitasking Redbook:
  - o 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
  - o http://www.vmworkshop.org/DJIPGATE.shtml

- You'll need to read the chapter in the Redbook to set it up (Chapter 4)
  - o (Former site) https://www.redbooks.ibm.com/redbooks/SG245164.html
    I haven't found a PDF version that is still available – send me an email if you need it.
  - o You decide which resources are shared, which users have access, and so forth

Service Machines – TOOLSRUN

— The "TOOLSRUN Distributed Disk/Conference Manager" allows you to share disks across multiple systems
  - Such as tools disks, code disks, configurations, whatever you store on minidisks and in SFS
  - It also allows coordinated updates by multiple people to a single disk
  - Authority to update is based on the permissions granted to you

— The disks are typically set up in a Master / Shadow configuration
  - One system has the master disk, all the others are shadows of that disk (SFS is also supported)
  - Peer relationships are possible, as well as partial shadows and other relationships

— Updates are sent to the master, which sends them to all shadows.
  - Updates are sent as spool files, using RSCS to send them to remote systems

— Appendable files are supported, where new text is appended to an existing file
  - This capability was used for conferencing within IBM for many years

— Updates and commands are sent to the TOOLSRUN server using a front end exec
  - This is the TOOLS exec

— The packages were recently brought up to date to the current version
  - The packages are TOOLSRUN, TOOLS, and TRSOURCE. Documentation in PDF format is included.

Rexx Programming tools

— These tools help you write or debug your own programs

- Programming and Debugging
  - TRACEXEC – Analyzes and helps debug complex Rexx applications, set and clear breakpoints, show the flow of the application, and provides run time statistics.
  - REXXG – Several execs and Xedit macros that help you write and maintain Rexx 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.

- A cross platform tool
  - RUNREXX – Develop cross platform Rexx programs using the eclipse framework

Rexx Interfaces

— Function packages and Rexx interfaces to various things.
- KM — New CSL interface to KMx cipher instructions
- GETSTHYI — Rexx interface to the Store Hypervisor Information instruction STHYI
- 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 MultiTasking 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 issue commands to a tape device

Programming tools

— Pipelines interfaces

- PUTFILES — Converse of the GETFILES Pipelines stage
- EMAIL — Pipelines SMTP Protocol EMAIL stage
- COMPUTE — REXX mathematics for each record in a pipeline
- FTPREXX — FTP client stage for Pipelines
- NETDPIPE — Pipe stage to handle NETDATA stream; Pipeline SENDFILE/RECEIVE
- ZLIBSTG — New zlib compression stage (https://github.com/jphartmann/cmslib-exec)
- KM — New CSL interface to KMx cipher instructions; with Rexx Pipes stages showing their use

• 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 old zvm.sru.edu page on vmworkshop.org
  Note: VMFTPUPD is the updated VMFTP package that you will want.
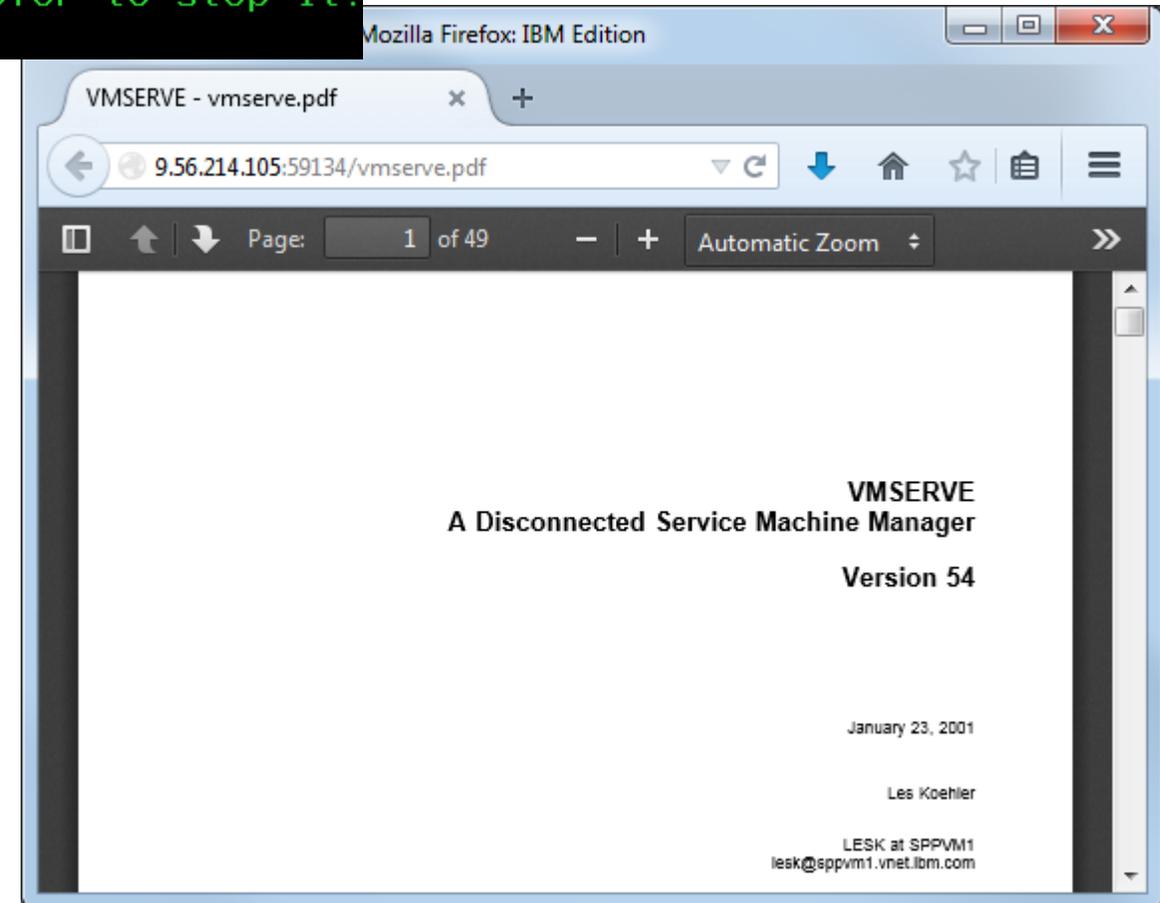 http://www.vmworkshop.org/HENSLER/vmftpupd.vmarc

Tools for CMS

— There are many tools that help you with your CMS environment, provide enhanced function, help you work with files, enhance XEDIT, and more.

— Working with files
- COMPARE – Compare files with XEDIT, compare minidisks or filelists
- PIPEFIND – A fast PIPE-based file searcher. Variety of search functions, along with a "fuzzy" search option
- 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

— Interfacing with TCP/IP functions and the Internet
- CHARLOTT – Full screen text-only web browser for CMS
  Note: SSL support in here is very old, so it is restricted to unencrypted connections
  Might be useful for downloading packages to your VM system however!

- MAILIT – A general purpose email sender program for CMS

— A recent one: Works with files and interfaces to TCP/IP
- SERVEPDF – View a PDF file (on a CMS disk) served from your CMS session in the web browser

SERVEPDF demo


```
C GDLVM7
 pickpipe query
Level UPLEVEL (110C000C) is current.
Ready; T=0.01/0.01 16:02:48
 servepdf vmserve pdf
See http://9.56.214.105:59134/vmserve.pdf or PIPMOD STOP to stop it.
```


Mozilla Firefox: IBM Edition

VMSERVE - vmserve.pdf

9.56.214.105:59134/vmserve.pdf

Page: 1 of 49   — +   Automatic Zoom

VMSERVE
A Disconnected Service Machine Manager

Version 54

January 23, 2001

Les Koehler

LESK at SPPVM1
lesk@sppvm1.vnet.ibm.com

— I run SERVEPDF and give it the name of a PDF file

— My emulator automatically shows the hotspot that I click on (or copy/paste to your browser)

— I view the PDF in my web browser!

— The exec ends as soon as it has pushed out the PDF file

Using Full screen CMS

— CMS does more than just 3215 line mode! (And has since VM/SP in the late '80s)

- See this example?

- From Alan Altmark's Fullscreen CMS page
  - Scroll backwards and forward
  - Overtype commands
  - Pop up and overlapping windows
  - PF key help always available
  - See the page for links to the main exec and some extensions.

  - Find it at http://www.vm.ibm.com/devpages/altmarka/fscms.html

More tools for CMS

— More Full-screen CMS tools

- OTTOSCR   – Screen scroller for Fullscreen CMS
- HISTORY   – Display the CMS command history file (maintained by OTTOSCR)

— Tools "hidden" in other components of z/VM

- DTCREACC MODULE on TCPMAINT 591   (Inside IBM, this is known as the REACC MODULE.)
  – Reaccess read only CMS disks that have changed.

— Text processing tools

- TXT2PDF   – Convert "plain text" files to PDF files, the Portable Document Format
  Code available from http://homerow.net/rexx/txt2pdf/ and documentation from
  http://www.lbdsoftware.com/TXT2PDF-User-Guide.pdf
- 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

Tools for CMS, continued

— 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
- AA — XEDIT prefix macro which aligns comments in C, Rexx, etc. source files

— General CMS tools

- 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/PSShowsb.shtml

Working with Performance data

— These tools work directly with raw monitor data (MONWRITE)

- MONRIP — Extract time-range data from a monwrite file (recently updated)
- 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
- SMTMET — Extract SMT Metrics from monitor records (for z13 and z14)
- D1R31 — Report on Domain 1 Record 31 CP Service Configuration record
- D3R2EC — Extract encrypted paging counter metrics from Domain 3, Record 2
- R4MON — Report on VM66095 EDEV FCP chpid and device records

— 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....?

— What tools did I miss?

— Any suggestions for a tool you wish existed?

— What are your favorite tools?

— Let me know for a future update!

The End

Thank you for listening!

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Sabula, IA   "Iowa's Island City"

Backup slides

The slides that follow are from an old presentation that discussed SFPURGER

— SFPURGER is part of CMS and fully supported
— It is documented in Chapter 3 of *z/VM: CMS Commands and Utilities Reference*

SFPURGER

- **A Utility to manage your system spool space**
  - Spooling all user's consoles creates spool files
  - Large systems accumulate thousands of spool files
  - Spool space is a limited resource
  - How do you keep it cleaned up?
- **Other products and tools exist to find the largest spool files**
  - Run as CMS commands or as service machines
  - Useful for a snapshot of spool usage
  - Manual effort to clean up

Using SFPURGER

- **Normally runs in a service machine**

  - One that can be programmed or started with a timed event
    - Operations Manager for z/VM
    - WAKEUP based machine
    - Or even PROP, triggered by the "midnight message"

- **2 files define options and define control statements**

  - SFPURGER OPTIONS
  - SFPURGER CONTROL

- **Default run option is TEST**

  - Tests your setup, produces output
  - No spool file maintenance is performed

SFPURGER OPTIONS

- **Optional file**

  – Not needed if you are satisfied with the defaults

- **Options you can define**

  – What hours are "prime shift"

  – Message format - MSG vs. MSGNOH (message noheader)

  – Specify your own control file name

  – Specify who receives LOG files

SFPURGER OPTIONS file example

```
***********************************************************************
*                                                                     *
*                    Sample SFPURGER OPTIONS File                     *
*                                                                     *
*                                                                     *
***********************************************************************


* Send console log to user ID LOGS on this node
CONSOLE    LOGS

* Erase LOG and RUN files that are more than 14 days old
KEEPDAY  14

* Set prime shift start and end times
PRIMSHFT  07:30:00 16:30:00

* Use defaults for the following:
*   MSGTYPE  SORTMOD  SFPCNTL  SOSCNTL  SFPMOD  APPEND
```

SFPURGER CONTROL

- **You may have more than one control file**

  - One for normal processing

  - One for emergency spool file processing ("SOS" argument)

  - A *nodeid* CONTROL file for node specific options
    - Must be enabled in the OPTIONS file

- **The default file names can be modified**

  - Specified in the OPTIONS file

- **The control file is used for actual spool file processing**

  - Spool file selection and action specifications

CONTROL file details

- **Each line must be 132 characters or less**

- **Blank lines are ignored**

- **An asterisk (*) in column 1 starts a comment line**

- **Only 1 spool file action allowed on each line**
  - Any words on the line after the action are ignored

- **Put the most likely spool file matches first**
  - File is processed top to bottom per spool file

Actions on spool files

These keywords can be specified for the ACTION

IGNore	Ignore the file
PURge	Purge the file
USERHold	Change to User hold
SYSHold	Change to System hold
USYSHold	Change to User & System hold
UNOHold	Change to not User hold
SNOHold	Change to not System hold
NOHold	Change to no hold (any kind)
User written	Invoke EXEC or MODULE

User written spool file actions

- **Named SPFXcccc**

  - First 4 characters must be SPFX
  - Last 4 are any valid file name 1 to 4 characters

- **Can be a file type EXEC or MODULE**

  - Standard CMS search order is used

- **Arguments passed to the routine:**

  - *SPFX *owner queue spoolid*

- **Non zero return code causes error message in the log**

- **Uses:**

  - Transfer file to another user
  - Notification, such as an unprocessed system dump
  - Send a reminder to a user

Spool file selection keywords

- **USERid**

  - Selected by VM User id that owns the spool file
  - Wildcards allowed

- **ORIGinid**

  - Selected by originator user id
  - Wildcards allowed

- **QUEue**

  - Selected by spool queue the file is in
  - RDR, PRT, PUN, NSS, IMG, TRF, UCR

- **Type**

  - Selected by spool file type
  - RDR, PRT, PUN, CON, DMP, NSS, IMG, TRF, UCR

Spool file selection keywords, continued

- **DAYs**
  - Selected by the number of days old

- **CLass**
  - Selected by the single letter spool file class. Valid classes A-Z, 0-9

- **FName or Ftype**
  - Selected by spool File name or File type
  - Wildcards allowed

- **Hold**
  - Selected by type of hold
  - USER, SYS, USYS (User and system), NONE

- **RECords**
  - Selected by the minimum number of records (1 to 12 digits)

Using Wildcards

- *** (asterisk) represents any 0-7 characters**

- **% (percent) represents any single character**

- **Examples**

  - abc*   All things that start with "abc"

  - %abc%   All things that are 5 chars with "abc" in the middle

  - %abc*   All things with "abc" as characters 2-4

Spool file processing

- **Every spool file is checked against each of the statements in the control file**

  – Starting at the top

- **First match defines the action for that file**

  – Rest of the control file skipped for that spool file

- **If no match found, the file is ignored**

  – Via an implied "catch-all" entry at the end of the control file that ignores any unmatched entries

- **Be careful with date matching on dump files**

  – Creation date may be the last IPL date of your system!

  - Recommendation: Skip processing of any file with an originid of SYSTEM

Example control file, SFPURGER CONTROL

```
* Ignore any system data files (privilege class E)
QUEUE NSS                                          ACTION IGNORE
* Keep spool files owned by maintenance user IDs
USERID *MAINT*                                      ACTION IGNORE
TYPE DMP       ORIGINID SYSTEM                      ACTION IGNORE
* Purge dump files after 2 weeks.  Ignore the rest
TYPE DMP       DAYS 14                              ACTION PURGE
TYPE DMP                                            ACTION IGNORE
* Purge files awaiting transmission after 2 months. Ignore the rest
QUEUE RDR      USERID RSCS        DAYS 60           ACTION PURGE
QUEUE RDR      USERID RSCS                          ACTION IGNORE
* Move console logs to the LOGS machine
TYPE CON       DAYS 1                               ACTION SFPXLOGS
* Purge any reader files in USERHOLD after 2 weeks.
QUEUE RDR      DAYS 14            HOLD USER          ACTION PURGE
* Let users read files from DIRMAINT for 5 days
QUEUE RDR      FNAME DIRMAINT FTYPE NEWMAIL DAYS 5  ACTION PURGE
QUEUE RDR      ORIGINID DIRMAINT CLASS A DAYS 5     ACTION SFPXDIRM
QUEUE RDR                                           ACTION IGNORE
* Purge listing output with 10000 or more records
RECORDS 10000 FTYPE LISTING                         ACTION PURGE
* Purge any other print files after 2 weeks.  Make the rest USER hold
QUEUE PRT      DAYS 15                              ACTION PURGE
QUEUE PRT                                           ACTION USERHOLD
* Purge any other punch files after 1 week.  Ignore the rest
QUEUE PUN      DAYS 8                               ACTION PURGE
QUEUE PUN                                           ACTION IGNORE
```

Output files

Note: *"yynnn"* is a Julian date

- **SFPURGER LOGyynnn**

  – The console and processing messages

  – Includes a summary of actions

- **SFPURGER RUNyynnn**

  – Option RUN, FORCE, or SOS specified

  – Describes the actions on each spool file

- **SFPURGER TSTyynnn**

  – Option TEST or TESTSOS specified

  – Describes the proposed actions on each file

Example output file – the Run file

```
**                          SFPURGER Run File                      **
**          Created by z/VM  5741-A05      7 Mar 2009   00:15:07    **
**                          OPMGRS4 at BRUCEZ10                     **

Reason code 1 QUEUE NSS ACTION IGNORE.
Reason code 4 USERID *MAINT* ACTION IGNORE.
Reason code 5 TYPE DMP ORIGINID SYSTEM ACTION IGNORE.
Reason code 12 TYPE CON DAYS 1 ACTION SFPXLOGS.
Reason code 13 QUEUE RDR DAYS 14 HOLD USER ACTION PURGE.
Reason code 14 QUEUE RDR FNAME DIRMAINT FTYPE NEWMAIL DAYS 5 ACTION PURGE.
Reason code 15 QUEUE RDR ORIGINID DIRMAINT CLASS A DAYS 5 ACTION SFPXDIRM.
Reason code 16 QUEUE RDR ACTION IGNORE.
Reason code 17 QUEUE PRT USERID PERFSVM DAYS 14 ACTION PURGE.
Reason code 18 QUEUE PRT USERID PERFSVM ACTION IGNORE.
Reason code 24 Queue *** Action Ignore.


           Action    Owner     Queue     Spool ID    Reason Code No.    File name    File type

SFP100I    IGNORE    *NSS      NSS       0005        Reason     001     INSTSEG      DCSS
SFP100I    IGNORE    *NSS      NSS       0007        Reason     001     CMSPIPES     DCSS
SFP100I    IGNORE    HAYDEN    RDR       0003        Reason     016     TOOLSRUN     NOTIFY
SFP100I    IGNORE    HAYDEN    RDR       0004        Reason     016     HAYDEN       BRUCEZ10
SFP100I    IGNORE    MAINT     PRT       0106        Reason     004
SFP100I    IGNORE    MAINT     PRT       0141        Reason     004
SFP100I    IGNORE    OPERATNS  RDR       0002        Reason     005     CPDUMP       CPDUMP
SFP100I    IGNORE    PERFSVM   PRT       0140        Reason     018     FCONMON      LISTING
SFP100I    PURGE     HAYDEN    RDR       0002        Reason     013     TOOLSRUN     ABEND
SFP100I    PURGE     PERFSVM   PRT       0139        Reason     017     FCONMON      LISTING
SFP100I    PURGE     VSMWORK1  RDR       0001        Reason     014     DIRMAINT     NEWMAIL
SFP100I    SFPXDIRM  SLES10D   RDR       0006        Reason     015     SLES10D      BRUCEZ10
SFP100I    SFPXLOGS  BLDSEG    RDR       0007        Reason     012
```

Example output file – the Log file

```
**                              SFPURGER Console Log                        **
**              Created by z/VM  5741-A05     7 Mar 2009   00:15:12        **
**                              OPMGRS4 at BRUCEZ10                         **

DMSCYS2469I SFPURGER OPTIONS file processed ...
DMSCYS2452I SFPURGER starting at 00:15:11 on 7 Mar 2009.
DMSCYS2453I Running in RUN mode - RUN09066.
DMSCYS2470I Using SFPURGER MODULE with SFPURGER CONTROL file.
DMSCYS2456I Erasing old output files till 2009052.

DMSCYS2496I Control card scan complete.

DMSCYS2459I Examining output file ...
DMSCYS2462I Spool file scanning begins ...
DMSCYS2482I Executing: CP PURGE HAYDEN RDR 0002
0000001 FILE  PURGED
DMSCYS2482I Executing: CP PURGE PERFSVM PRT 0139
0000001 FILE  PURGED
DMSCYS2482I Executing: CP PURGE VSMWORK1 RDR 0001
0000001 FILE  PURGED
DMSCYS2482I Executing: SFPXDIRM *SFPX SLES10D RDR 0006
0000001 FILE  PURGED
DMSCYS2482I Executing: SFPXLOGS *SFPX BLDSEG RDR 0007
0000001 FILE  CHANGED
RDR FILE 0007 SENT TO   LOGS     RDR AS  4855 RECS 0045 CPY  001 T NOHOLD NOKEEP
0000001 FILE  TRANSFERRED
DMSCYS2463I 144 of the 227 spool files HAVE been purged.
DMSCYS2485I 0 of the 227 spool files HAVE been changed.
DMSCYS2486I 8 of the 227 spool files HAVE been handled by user exits.
```

Example control file, SOS CONTROL

* Ignore any system data files (privilege class E)

```
QUEUE NSS                                                ACTION IGNORE
* Keep spool files owned by maintenance user IDs
USERID *MAINT*                                            ACTION IGNORE
TYPE DMP        ORIGINID SYSTEM                             ACTION IGNORE
* Purge dump files after 1 day.  Ignore the rest
TYPE DMP        DAYS 1                                    ACTION PURGE
TYPE DMP                                                  ACTION IGNORE
* Purge files awaiting transmission after 5 days. Ignore the rest
QUEUE RDR      USERID RSCS        DAYS 5                  ACTION PURGE
QUEUE RDR      USERID RSCS                                ACTION IGNORE
* Move console logs to the LOGS machine
TYPE CON        DAYS 1                                    ACTION SFPXLOGS
* Purge any reader files in USERHOLD now.
QUEUE RDR      DAYS 14              HOLD USER             ACTION PURGE
* Let users read files from DIRMAINT for 5 days
QUEUE RDR      FNAME DIRMAINT FTYPE NEWMAIL DAYS 5  ACTION PURGE
QUEUE RDR      ORIGINID DIRMAINT CLASS A DAYS 5     ACTION SFPXDIRM
QUEUE RDR                                                 ACTION IGNORE
* Purge listing output with 10000 or more records
RECORDS 10000 FTYPE LISTING                              ACTION PURGE
* Purge any other print files after 3 days.  Make the rest USER hold
QUEUE PRT      DAYS 3                                    ACTION PURGE
QUEUE PRT                                                 ACTION USERHOLD
* Purge any other punch files after 3 days.  Ignore the rest
QUEUE PUN      DAYS 3                                    ACTION PURGE
QUEUE PUN                                                 ACTION IGNORE
```

Scheduling SFPURGER execution

- **Operators could run it manually**

  – But, not everyone has an operator!

- **Find or write a simple scheduling SVM**

  – Maybe autolog a user named SFPURGER

  – Some packages exist on the VM downloads page

- **Use operations manager software**

  – Such as Operations Manager for z/VM

  – Run on a schedule <u>and</u> when spool space is filling up

  – Usage examples on the next page

Scheduling using Operations Manager for z/VM

- **In my command file:**

- DEFSCHD Name SFPURGER When 00:15 Action EXEC Parm 'RUNSFPRG RUN'

- DEFSMON Name SPOOLMON Usage 093-100 Interval 5 Action EXEC Parm 'RUNSFPRG SOS'

- DEFACTN Name EXEC Command 'EXEC &P' Output LOG Env SVM

- **The RUNSFPRG EXEC:**

```
/* RUNSFPRG EXEC - Run SFPURGER via Operations Manager */
Address Command
arg sfpurgopts
   /* Get disk with SFPURGER code                       */
'EXEC VMLINK MAINT 193 (NONAMES PUSH'
   /* Make output directory my A disk and run SFPURGER */
'EXEC VMLINK .DIR ATS:OPMGRM1.SFPURGER <* A>',
     '(NONAMES WRITE INVOKE EXEC SFPURGER' sfpurgopts
erc=RC
   /* Release any disks we may have accessed            */
'EXEC VMLINK MAINT 193 (NONAMES POP'
Exit erc
```