z/VM Installation -- It's Installed, *NOW* What?

(Or: What we learned "on the job")

Session 9120
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SHARE – Baltimore, MD

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Disclaimer

(you expected something else?)

- How *THIS* customer does it…
  … after years of learning from others.
- **Your Mileage May Vary**.
- This session will probably re-appear with significant improvements at the next SHARE.
  - After other "old timers", ***and YOU***, chip in ideas, tell me what I've done wrong (still), what I should do differently, and what else I should be doing!
  - "**SHARE**, it's not an acronym – it's what we **DO**!"

Mandatory "Brag Sheet"
or: "Why should we listen to *him*?"

- Started as a "Teleprocessing Operator" in Feb. 1972
  - Thus, in Data Processing for over 30 years!
- VM-exclusive (mostly) since 1978 (25+ years of VM!)
  - (VM 370 Release 5 Program Level Change 6)
- Installed VM at Hewitt Associates in 1984
- Chaired CAVMEN for 6+ years
- Member of SHARE VM Technical Steering Committee since August 1997
- According to envelopes of various mailings: CIO; Partner-In-Charge; and Chief Cook, Manager of VoiceMail Systems

Agenda

- Where can I look for help?
- CP Directory
- CP_Owned DASD
- “SYSTEM CONFIG” file
- Backup and Restore
- What to document “just in case”
- Minidisks vs. Shared File System
- Best practices (CYA)
- Miscellany

Where do I look for (more) help?

- Obviously: IBMLink (leverage your support dollars):
  - https://www-306.ibm.com/ibmlink/link2/logon/logonPage.jsp
- IBM Publications (review them yourself back at the shop):
  - http://www.vm.ibm.com/library/ (The VM library), which points to…
  - http://publibz.boulder.ibm.com/bookmgr_OS390/libraryserver/zvmv5r2/ (The z/VM LibraryCenter)
  - http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/Shelves/hcsh2a80 (The z/VM Bookshelf)
  - http://www-03.ibm.com/servers/eserver/zseries/zos/bkserv/zvm.html (The "z/VM Collection" bookshelf – Discs)
  - http://www-03.ibm.com/servers/eserver/zseries/zos/bkserv/zvmpdf/zvm52.html (The z/VM PDF Library)
    - Program Directories, data areas, control blocks, monitor records, tri-fold Installation Summaries, redbooks, whitepapers, reports, spec sheets, brochures, reference guides, and lots more
  - http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi?CTY=US (the IBM Publications Center)
  - http://www-03.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/ ("LookAt" messages)
- Informal but VERY prompt, helpful, and flameless discussion lists:
  - Send email text to: ***LISTSERV@LISTSERV.UARK.EDU***
    - **SUBSCRIBE IBMVM firstname lastname ←--- Late change, *update your handout*!**

    Note: There are rumors that the VMESA-L *list name may be changed very soon.*
  - Send email text to: ***LISTSERV@VM.MARIST.EDU***
    - **SUBSCRIBE CMS-PIPELINES firstname lastname**
  - Send email text to: ***LISTSERV@VM.MARIST.EDU***
    - **SUBSCRIBE LINUX-390 firstname lastname**

Where else can I look ***IMMEDIATELY***?

You are in luck, you are attending ***the best*** **interactive training value** by being right here …

at SHARE. *Sessions still to come this week …*

- This page used to contain a list of 25 or so good SHARE sessions for those new to z/VM or Linux

- Good news/Bad news: When preparing the slide for this presentation the list accumulated to over 108 sessions.

Summary: You're getting lots for your money.

CP Directory

- The "**USER DIRECT**" file - where VM users (virtual machines of all types) are defined.
  - Documented in z/VM CP Planning and Administration manual.
  - After a z/VM installation, located on MAINT's 2CC minidisk.
- Most basic statements:

```
USER jqpublic password 64M 2047M G 64
  ACCOUNT acntcode distcode
  ACIGROUP as_given
  MACHine XA
  IPL  CMS  PARM AUTOCR
  CONSOLE 009 3215 C
  SPOOL   00C 2540 READER *
  SPOOL   00D 2540 PUNCH D
  SPOOL   00E 1403 P
  LINK MAINT 190  190 RR
  LINK MAINT  19D  19D RR
  LINK MAINT  19E  19E RR
  MDISK  0191  3390  beg_cyl  num_cyls  volser  MR
```

CP Directory

- After making any change, ALWAYS check for minidisk overlaps.
  - It is ***very*** easy to define more than one minidisk using all or some of the same cylinders used by another minidisk.
    - Results in “one-way” file encryption.
  - DIRECTXA (compiles the “USER DIRECT” file) does not report minidisk overlaps (since they may be valid).
  - **Run the DISKMAP and/or DIRMAP commands, carefully checking the output for overlaps.**
  - DISKMAP and DIRMAP also report “Gaps”, which are free cylinders upon which you can allocate minidisks.

CP_Owned DASD

- All DASD attached to VM for VM's use must be **INIT'**ed by ICKDSF with parameters: "**CPVOLUME**", "**MODE(ESA)"** and "**NOFILLER**".
- The CPFMTXA EXEC is a nice front-end to the ICKDSF MODULE, defaulting to MODE(ESA) and NOFILLER, installing a "no room at the inn" dummy VTOC.
- Cylinder zero: home of the volume Allocation Bit Map
  - Tells CP how each cylinder is used, and in some cases if it is active.
  - Allocations: PERM, PARM, DRCT, PAGE, SPOL, TDSK
  - ALWAYS allocate cylinder zero as PERM to protect the Allocation Bit Map.

CP_Owned DASD

- The “SYSTEM CONFIG” file defines which DASD are attached to the system when it is IPLed.
- Some DASD are critical … pretty much all DASD with allocations other than PERM, and even some of those.
- SPOOL and PAGE DASD are *very* difficult to get offline on a running system.
  - You can prevent further allocation to them, but cannot cause SPOOL and PAGE cylinders to be brought back into storage to be moved to another DASD. Plan for system outages to remove SPOOL or PAGE DASD. Any type can be added on-the-fly, without an IPL.

The "SYSTEM CONFIG" file;
(On MAINT's CF1, CF2 and CF3 disks)

First and last executable statements:

```
   Say "Beginning: 'SYSTEM CONFIG' from MAINT's CFn disk..."
/*************************************************************************/
/*                                                                       */
/* +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++   */
/* Remember to: >>-CPSYNTAX—fid--+-----------------------------+--→< */
          /*                                  +-(-
+-------------------------+      */
/*                                    +-CPUID model-+-----------+      */

/*                                                    +-serial_no-+      */
/* +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++   */
/*                                                                       */
/*************************************************************************/

. . . full "SYSTEM CONFIG" file entries go here . . .

    Say "Completed: 'SYSTEM CONFIG' from MAINT's CFn disk."
/* End of SYSTEM CONFIG file */
```

The "SYSTEM CONFIG" file; … and … Best practices;

- SPOOL volumes in first Slots
  - Any change in existing SPOOL volume ***SLOT order*** ***will*** result in a **loss of all SPOOL files on that and trailing SPOOL volumes.**
  - You can always add more SPOOL slots lower down (that's why it is good to have RESERVED slots up top specifically for future SPOOL volume use.
  - Linux virtual machines will require more SPOOL due to DCSS usage – plan for it. (DCSS' are stored in SPOOL)
  - You can remove completely-empty SPOOL volumes (difficult to get completely empty), as long as they do not affect the SLOT NUMBER order of the remaining SPOOL volumes.

The "SYSTEM CONFIG" file; … and … Best practices;

Place SPOOL volumes up front…

```
CP_Owned   Slot   1  VMSP01   OWN          STRONGLY suggested -- spool  volumes in FIRST Slots!
CP_Owned   Slot   2  VMSP02   OWN          STRONGLY suggested -- spool  volumes in FIRST Slots!
CP_Owned   Slot   3  VMSP03   OWN          STRONGLY suggested -- spool  volumes in FIRST Slots!
CP_Owned   Slot   4  VMSP04   OWN          STRONGLY suggested -- spool  volumes in FIRST Slots!

CP_Owned   Slot   6  RESERVED       Reserved for another SPOOL volume (or anything)
CP_Owned   Slot   7  RESERVED       Reserved for another SPOOL volume (or anything)
CP_Owned   Slot   8  RESERVED       Reserved for another SPOOL volume (or anything)
CP_Owned   Slot   9  VMDUMP   DUMP          Still a SPOOL volume, convenient if you have enough DASD so
                                    that contiguous DUMP space is always found.
CP_Owned   Slot  10  VMR52A   OWN          Example of System Residence Product volumes
CP_Owned   Slot  11  VMR52B   OWN
CP_Owned   Slot  12  VMTD01   OWN Example of Temp-disk volumes
CP_Owned   Slot  13  VMTD02   OWN
CP_Owned   Slot  14  RESERVED
CP_Owned   Slot  15  RESERVED
CP_Owned   Slot  16  RESERVED
CP_Owned   Slot  17  RESERVED
CP_Owned   Slot  18  RESERVED
CP_Owned   Slot  19  RESERVED

CP_Owned   Slot  20  VMPP01   OWN Example of Program Product volumes
CP_Owned   Slot  21  VMPP02   OWN
CP_Owned   Slot  22  VMPP03   OWN
CP_Owned   Slot  23  VMPP04   OWN
CP_Owned   Slot  24  VMPP05   OWN
CP_Owned   Slot  25  VMPP06   OWN
CP_Owned   Slot  26  VMPG01   OWN Example of Paging volumes
CP_Owned   Slot  27  VMPG02   OWN
. . .
```

The "SYSTEM CONFIG" file;
Copies on MAINT's CF1, CF2, and CF3 disks

- Backup (copy) the primary 'PARM' disk (MAINT's CF1) to MAINT's backup CF2 disk.
  - ***Tip:*** It is important to keep the CF1 and CF2 disk in synch every time you update the CF1 (or have any backout plan, see notes).
  - Should the CF1 become 'damaged', you can IPL using the CF2 disk.
  - ***Tip:*** RENAME files on the CF1 and CF2 before copying replacement files.
    - (e.g. RENAME CPLOAD MODULE x -1CPLOAD MODULE x)
    - Just after installation, I like to COPY CPLOAD MODULE x CPLDSDO MODULE = (OLDDATE
  - Consider backing up CF1 to CF3 (DDR copy) before changes, then keeping CF1 and CF2 "in sync" -- *two* ways to back out changes!
- ***ALWAYS run "EXEC CPSYNTAX"*** after *every* change to the "SYSTEM CONFIG" file.

Backup and Restore; What to back up?

- To steal Bit Bitner's standard performance answer:
  "It Depends"
- For a **test** system – perhaps only things you are likely to change, esp. those that can prevent an IPL.
- For a **production** system:
  - For D.R. purposes: a CKD-format (e,g, DDR, VM:Backup Physical, FDR) backup of sysres DASD, program product DASD.
  - Normal file-level backups of everything.
  - Separate backup of the USER DIRECT file.
    - *Good idea to DIRECTXA USER DIRECT to DRCT cyls on second sysres DASD.*
  - Hardcopy reports from DIRMAP and/or DISKMAP utilities (on the S-disk).
  - Send hardcopy reports offsite, too!

What to document "just in case"; The *worst* happens: What's Where?

- Know where your PARM cylinders are (so you can point to them with SALIPL).
- Know where your source directory cylinders are.
  - Pick a DASD volume and cylinder address you will remember without a hardcopy listing. You already ***KNOW*** that hardcopy will be **missing** in a real disaster. (E.g. VMPP01, cylinder, 1 may begin the source directory minidisk).
- Know where your backup catalog (e.g. VM:Backup 1B0) cylinders are.
  - Again, perhaps volser VMPP02, beginning at cylinder 1.
- Memorize the syntax:
  - **CP DEFINE MDISK AS vdev start count|END volser**

What to document "just in case"; Even worse happens!!: Stand-Alone IPL-able Utility Tape(s)

- Create Stand-Alone IPL-able Utility Tape (ICKDSFSA, DDRXA, etc.)
  - May have been done by the UTILITY command when executing "Store a Backup Copy of the z/VM System to Tape" during your z/VM installation. **If not – create one**!
  - A single tape requires at least one IPL from the HMC to access each program.
    - There's a pause (sometimes long, sometimes requiring "ENTER" to be pressed on the terminal) between each IPL.
  - You may want to create separate IPL-able tapes for each utility.
    - Advantage: a single IPL, making "HMC time" a little less frustrating.
  - You can test these tapes from a VM userid with a tape drive ATTAChed.
    - Just enter the command: CP IPL vdev CLEAR (where "vdev" is the *VIRTUAL* tape drive address where the tape is already mounted and ready).
- Have a *hardcopy manual* available which explains each utility (and try them out ahead of time!).

What to document “just in case”; How as DASD allocated?

- It has helped us more than once to have weekly hardcopy printouts of:
  - The Allocation Bit Map for every system-level DASD
    - Our user minidisks are all on DASD allocated as PERM space.
  - The CP Directory “USER DIRECT” file, or other maps.
    - Reports generated by VM:Secure, DIRMAINT, RACF/VM, or other External Security Managers (ESMs).
- Useful at Disaster Recovery sites, too.
  - Send a copy offsite!

Minidisks vs. Shared File System, for CMS-intensive customers.

- Minidisks:
  - Easy to allocate (except for the overlap potential).
  - Easy to back up.
  - Low administrative overhead.
  - Do not allow easy space expansion.
    - Need all users to release the old minidisks, allocate a new minidisk, format it, copy the files from the old minidisk, permit users to access the newly-sized minidisk, delete the old minidisk.
- Shared File System
  - Easy to allocate and increase or decrease user space.
  - More difficult to back up without a VM:Backup-like product.
  - Requires much more Administrative effort, especially without the SafeSFS product (from Safe Software, Inc.)

Best practices;
Change Identification/Backout

- Learn "What Mother Never Told You About VM Service":
  - **Rule Number 1: "*NEVER CHANGE ANYTHING IBM SENDS YOU*"!**
    - Instead **change a copy** *on another disk*, or copy the IBM version to another 'instant backup' name on the same disk and change the original file.
  - **Rule Number 2: "Keep your stuff separate from IBM's".**
  - ***See*:** "What Mother Never Told You About VM Service" (1983).
    - http://pucc.princeton.edu/~melinda/tutorial.pdf
    - A bit outdated, but valuable insight.
    - Basics of Control File, Aux File, Update Files remain the same.

Best practices;
Change Identification/Backout

- You always want a means (which does not require a tape mount!) to see what IBM sent originally.
  - Your problem may keep you from mounting or reading a tape, which can prevent restore of that changed file.

Best practices;
CMS file dates

- When using the **COPYFILE** command, **religiously** use the **OLDDATE** option, unless there is a significant reason to use the current date.
  - Not wise to set COPYFILE default to OLDDATE since that would break many existing (IBM, ISV, and local) procedures.

- Undocumented module DMSPLU will let you change the date and time of a file.
  - **From: DMSPLU ASSEMBLE on MAINT's disks**

```
PARMS:  FN  FT  FM  DATE  TIME   (ALL REQUIRED, POSITIONAL)
        DATE = MM/DD/YY OR MM/DD/YYYY
        TIME = HH:MM:SS
```

Best practices;
When to IPL (religion)

- Keeping VM up without an IPL for years does not necessarily make it “better” than some “Other System”. We already **know** VM will stay up indefinitely!
- It’s certainly not better when:
  - Not everything comes back up after ”n+” months (or years) of “incidental” changes that have crept in and become active only after an IPL.
    Possibility: many problems *all at once*!
  - Your system crashes due to “core cancer” (perhaps lots of System Data Files with ancient users, or badly behaved applications).
  - Applications keep using obsolete, ACCESSed minidisk files or System Data Files, wasting more storage and increasing paging..
  - Your operators (or *you*) can’t remember how to IPL.
  - Self-preservation: Something changed on some Other System.
- Try to schedule regular IPLs when your business permits, but still giving you time to diagnose and repair problems before prime time.

Best practices;
Stand Alone Program Loader (SALIPL)

- Create a more meaningful Stand Alone Program Loader (SALIPL).
  - Our IPL from the HMC with “LOADPARM console_rdev” brings up:

```
STAND ALONE PROGRAM LOADER: z/VM VERSION 5 RELEASE 2.0
DEVICE NUMBER:    0910       MINIDISK OFFSET:    00000000   EXTENT:  1
MODULE NAME:      CPLOAD     LOAD ORIGIN:        1000


--------------------------------IPL PARAMETERS-------------------------



---------------------------------COMMENTS-----------------------------

Some possible IPL PARAMETERS section (above) entries:
CONS=ccuu           PROMPT                <--- Used most often
NOEXITS             FN=system             FT=config
PDNUM=ParmDiskNum   PDVOL=ParmDiskVolser  PDOFF=ParmDiskcylOffset

------------------------------------------------------------------------

9= FILELIST  10= LOAD  11= TOGGLE EXTENT/OFFSET
```

- See: MKSALIPL EXEC at the end to make one that helps *your* site.

Best practices;
Stand Alone Program Loader (SALIPL)

- Pressing F9=FILELIST, then F4=SORT(TYPE) results here with a display like:

```
 STAND ALONE PROGRAM LOADER: VM/ESA VERSION 2 RELEASE 4.0
  FILENAME FILETYPE FORMAT LRECL    RECORDS     BLOCKS     DATE       TIME
-1SYSTEM CONFIG   D1 F         80        721         15 10/10/03  8:14:36
-2SYSTEM CONFIG   D1 F         80        721         15  7/27/03 22:29:00
-3SYSTEM CONFIG   D1 F         80        709         14  7/21/03  9:24:53
-4SYSTEM CONFIG   D1 F         80        709         14  4/25/03 10:48:12
-5SYSTEM CONFIG   D1 F         80        709         14  4/23/03 14:34:52
-6SYSTEM CONFIG   D1 F         80        695         14  4/21/03 12:04:34
-7SYSTEM CONFIG   D1 F         80        671         14  4/15/03 13:36:07
-8SYSTEM CONFIG   D1 F         80        680         14  4/10/03 15:31:15
-9SYSTEM CONFIG   D1 F         80        675         14  4/08/03 16:28:56
SYSTEM   CONFIG   D1 F         80        721         15 12/01/03  8:13:31
DISASTER IMBED    D1 F         80          1          1  7/18/02 10:01:41
HALINVA1 IMBED    D1 F         80          1          1  7/18/02 10:01:51
HALINVX1 IMBED    D1 F         80          1          1  7/18/02 10:01:48
RECOVERY IMBED    D1 F         80          1          1  7/18/02 10:01:45
SYSTEM   LOGMSG   D1 F         80          1          1  5/31/95  8:34:39
DEFAULT  LOGO     D1 F         78         16          1  3/17/99 10:59:00
various  LOGO's   D1 F         78         16          1  3/17/99 11:15:06
SNA      LOGO     D1 F         78         16          1  3/17/99 15:25:39
SNA      LOGOINFO D1 F         78          6          1  8/03/99 11:01:05
-1CPLOAD MODULE   D1 V      65535         78       1211  8/30/02 15:14:09
-2CPLOAD MODULE   D1 V      65535         77       1207  4/06/01 13:11:26
CPLOAD   MODULE   D1 V      65535         78       1211 11/07/02 14:24:09
CPLDB4VX MODULE   D1 V      65535         77       1199  5/23/00 12:15:23
ICKSADSF MODULE   D2 V      65535         15        218  8/05/99 16:12:07
HAXACO   TRS010HP D1 F         80         86          2  8/31/00 16:30:09
HCPAUS   TRS080HP D1 F         80         19          1  8/31/00 16:29:04
HCPQLN   TRS090HP D1 F         80         21          1  1/19/01 11:11:25
HCPQON   TRS090HP D1 F         80         21          1  3/08/01 10:45:22
HCPQAI   TRS110HP D1 F         80         27          1  4/25/03 10:37:14
3=QUIT  4=SORT(TYPE)  5=SORT(DATE)  6=SORT(NAME)  7=BACK  8=FORWARD  11=SELECT
```

Best practices;
LOGO files on CONFIG disks
(On MAINT's CF1, CF2 and CF3 disks)

- Logo files and other samples can be found on MAINT's 2C2 "Samples Disk" (don't miss "DRAWLOGO SAMPEXEC").

- Our "SNA LOGOINFO" contains easily-forgotten comments:

```
/* Just a reminder that once the SNA logo has been updated, and the  */
/* command:  CPACCess MAINT CF1 A SR                                 */
/* has been entered, you won't see any update on the logo until after*/
/* command: CP REFRESH LOGOinfo LOGO CONFIG                          */
/*     and: CP REFRESH LOGOVSM VSCS                                  */
/* mrw 03/17/99                                                      */
```

- KEY POINT: ***place comments where you're likely to trip over them.***

Best practices;
Building a *new* TEST system.

- **Right after any new system has been tested, and before placing it into production)**

- Where will you test changes to the new system once it goes into production?
  - DDR copy the new sysres volumes to *test* sysres' (remember to change USER DIRECT, SYSTEM CONFIG, CA product 'DIRECT vdev volser' **records**.
  - **"CP DEFINE MDISK"** *is your friend* - memorize it! Practice beforehand.

    Added since handouts were printed…
    - Understand that DEFINE MDISK always gives R/W access – you can shoot your own foot.
    - If you don't need to write, for DEFINED MDISKs always: ACCESS vdev fm/fm
      - *"fm/fm" accesses the vdev as a R/O extension of itself.*
  - Be sure the test system works *before* migration.
    - It can help you back out errors in production.
    - It can be IPLed on the bare metal (if you did it right).

Best practices;
Building a new TEST system.

- Define a new 1st Level userid
  - In this presentation called “VM520”
    - See examples at the end of handouts.
  - Privclasses “**B,F,G**” (we did not find a need for C, D, or E) VM userid.
    - B = System Resource Operator.
      - *Needed only if VM520 cannot issue site-defined TAPE MOUNT commands.*
    - C = System Programmer.
      - *You* are *one; but potentially dangerous and not needed for an installation.*
    - D = Spooling Operator (system-wide, ALL spool files).
      - *Not needed and DANGEROUS!*
  - Define a 191 mdisk for local files (PROFILE EXEC, etc.)

Best practices;
Building a new TEST system.

- Have AUTOLOG1 (or 2) bring up your VM520 system 2nd level for user testing every time you IPL production.

- See at the end of this handout:
  - Sample directory entry for userid **VM520**

Miscellany:
Transferring files between Level 1 and Level 2 Level 1 = Production, Level 2 = test system)

- Many ways (SENDFILE, FTP, SFS, etc.) – one easy example:
  - Define userid ‘XFER’ (or some other easy-to-identify ID) on Level 1 and Level 2 with a minidisk sharing the same extents, on both systems, on the same DASD.
    - “Your gun, your foot” … What me worry?
  - Normally “one way encryption” (both system can write to the disk at the same time).
  - In this case, you’re ***only copying*** data, you still have the original files on the source system minidisk.

Miscellany:
LOGON/LOGOFF FORCE PENDING
Hung users – getting doc, and saying goodbye.

- On rare occasions a userid will get “hung” in a “Logoff/Force Pending” state, being unable to complete logon or logoff. This is usually due to an incomplete I/O, but not always.
- Over the years, compliments of VM sysprogs on VMSHARE and the VMESA-L discussion lists, the following list was put together (some commands require more than privclass “G”):
  - If you have the time, simply waiting 15 minutes for CP to perform housecleaning chores might free the userid, completing the LOGOFF or FORCE.
  - Use the public domain utility "TRACK" to determine if the userid is awaiting completion of an I/O to a particular unresponsive device.
    - *Use the commands:*
    - *TRACK hungid DEV CLASS * IO PENDing*
    - *TRACK hungid DEV CLASS * IO ACTIVE*
    -
    - *Nota bene: As of 23 Feb 2006 TRACK can be obtained from:*
    - *http://vm.marist.edu/track/*

Miscellany:
LOGON/LOGOFF FORCE PENDING
Hung users – getting doc, and saying goodbye.

- **GETTING DOC *first***: Before attempting anything that actually changes the hung userid, if you can (consider communication time-outs which may occur that could affect other users) before muddying the waters, get a current system dump for IBM to diagnose later. From a privclass "A' user: From a privclass "A' user:
  - *CP QUERY DUMP (then ensure that it is going to disk)*
  - *Then: CP WNG ALL This system may be non-responsive for a few minutes while diagnostic information is obtained.*
  - *Then: CP SNAPDUMP*

- Sometimes a simple message frees up the "hungid" without further ado. From a privclass A, B, or C userid, issue:
  - *CP WNG hungid Hello*

- If the ID was awaiting I/O to a terminal, simply connecting from a working terminal may free the ID. From a free terminal, issue:
  - *CP LOGON hungid* ***HERE***

Miscellany:
LOGON/LOGOFF FORCE PENDING
Hung users – getting doc, and saying goodbye.

- For users logged on via TELNET terminals, issue:
  - *NETSTAT TELNET*
  - *Find the matching tn3270 connection, and issue:*
  - *NETSTAT DROP conn_num*

- "CPHX" is reported to cancel pending CP commands: ATTACH, LOCATE, LOCATEVM, and VARY ONLINE|OFFLINE (see HELP for more detail).
  - *From a privclass "A" userid, issue:*
  - *CP CPHX hungid*

Miscellany:
LOGON/LOGOFF FORCE PENDING
Hung users – getting doc, and saying goodbye.

- If TRACK (above) showed an active I/O which cannot be remedied (e.g. by making a tape drive "Ready"), the I/O may be able to be cancelled. From a privclass "A" userid, issue:
  - *CP HALT rdev*
- Due to queued I/Os or recalcitrant devices, HALT may need to be issued repeatedly until a message similar to the following is received:
  - *Halt was not initiated to tape nnnn because the device as not active*
- If nothing freed the hung user, open a Problem Management Report (PMR) with IBM, and provide the SNAPDUMP for analysis.

Miscellany: *(and maybe, Best practices)*
CMS Pipelines Runtime Library (RTL)

- Not installed as part of IBM's CMS distribution (which comes with "Endicott Pipes").
  - Read: Another little task for you (but well worth the effort).
- Contains everything supplied with "Endicott Pipes", plus many added stages and other enhancements.
  - PIPERLD - CMS Pipelines Runtime Library
  - http://vm.marist.edu/%7Epipeline/
- "PICKPIPE EXEC" (on the IBM VM Download page) lets you swap back and forth between Pipes versions.
  - http://www.vm.ibm.com/download/packages/

Miscellany:
Re-labeling DASD

- **Requires understanding of the "USER DIRECT" file.**
  - See: "z/VM CP Planning and Administration"
- **Requires updates to:**
  - DASD label (volser) -- use the CPFMTXA EXEC
  - "USER DIRECT" (DIRECTORY statement)
  - "SYSTEM CONFIG" on MAINT CF1, CF2.
  - C.A. "product CONFIG" file "DIRECT" records
    - e.g. "DIRECT vdev volser"
- A DASD **naming convention** can make your job simpler.
  - We were required to begin VM DASD labels with "VM" (change to meet your needs), hence:
    - **VMR52A, VMR52B etc. (In place of IBM's 520RES)**
    - **VMSPnn – spool packs (In place of IBM's 520SPL)**
    - **VMDUMP – if you are "DASD rich", reminder to keep DUMP space contiguous and ensures there is enough.**
    - **VMPGnn – paging volumes (best to keep paging and spool alone on DASD due to seldom-ending channel programs).**
      (In place of IBM's 520PAG)
    - **VMPPnn – Program Product MDISKs and SFS spaces. Makes D.R. easier: first restore VMRnna and VMPPnn, while formatting VMSPnn,**
      VMPGnn, and Allocating VMTDnn. Then IPL *your* system to restore everything all "non-system" DASD.
    - **VMTDnn – keeps TDISK separate from other MDISKs, but can result in heavy I/O.**
    - **VMUnnn – "user" files**

Miscellany:
Re-labeling DASD

- ***Tip:*** For each DASD volume, create a userid to permit a CP LINK to the volume as needed.

```
USER -volser- NOLOG 64M 64M
 MDISK A00 3390   0000 0001 volser R
 MDISK F00 3390   0000 3339 volser R
```

- **Be careful to NOT format cylinder 0 (zero);** it contains the "Allocation Bit Mask" describing the use of each cylinder (such as PARM, DRCT, WARM, CKPT, SPOL, PAGE, etc.), and … the IPL TEXT!

  - You'll know you did if you attempt to IPL and receive message:

    HCPVMI232E IPL UNIT ERROR; IRB 00404017 00020A78 00200018 00800000

  - **Good Rule of Thumb: Don't allocate minidisks on cylinder zero, there are lots of other cylinders to use, why go looking for problems?**

Miscellany:
"HELPful" help files.

- Ancient HELP files have a way of accumulating. A tip from Roger Deschner at the University of Illinois Chicago; when copying groups of non-VMSES/E help files to the 19D disk.
  (VMSES/E files get to MAINT's 19D via VMFCOPY):
  - **For non-VMSES/E help files going to the 19D disk, create a "product LISTFILE x1" to go on the 19D disk, too.**
    E.g. for VM:Backup help:
    - ***"LISTFILE * * W (EXEC LABEL"***
    - ***"COPY CMS EXEC A VMBACKUP LISTFILE x1 (OLDDATE"***
- When using the HELP command, only filemode 'x2' files are accessed. Using "filename LISTFILE x1" keeps them out of sight of users (less clutter), saving memory. All accessed files use up memory for pointers in the Active File Table (AFT).

Best practices:
REXX (religion)

- REXX syntax can inspire near-religious wars!
- Be extravagant with comments when writing code. They will help you when you get old, gray-haired, and forget the code after a “long time”.
  - If you’re like me, they’ll help you next week.
  - There **is** such a thing as **too many comments:**

```
'ERASE SOME FILE A'  /* Erase the file */
```

- Try to place comments where they explain something that’s **not obvious**, could have multiple meanings, is based upon the results of command which may resturn different results in different circumstances, etc.

Best practices:
REXX (religion)

- I like Boolean variables (those TRUE (1) or FALSE (0) flags) to begin with '?' -- E.g. "If ?lost then …"
  - Helps next reader understand it can only be true or false.
  - Mild problem with typical Pipe "ENDCHAR" and VAR stage.
- Avoid use of the 'INTERPRET' statement
  - (very powerful, very confusing).
- Avoid use of the "Logical Not' symbol " ¬ ", instead use "<>", or "\?true"
  - Other operating systems which support REXX of some flavor (e.g. Regina REXX), but do not always understand "Logical Not".

Best practices:
REXX (religion)

- In REXX code:
- I tend to line up 'SELECT/DO/END' clauses, helping find missing or extra END statements in XEDIT (what a ***GREAT*** editor!):

```
     If  ?AlmostDone  then
         Do until ?AllDone
            many statements
            many statements
         End /* until ?AllDone */
```

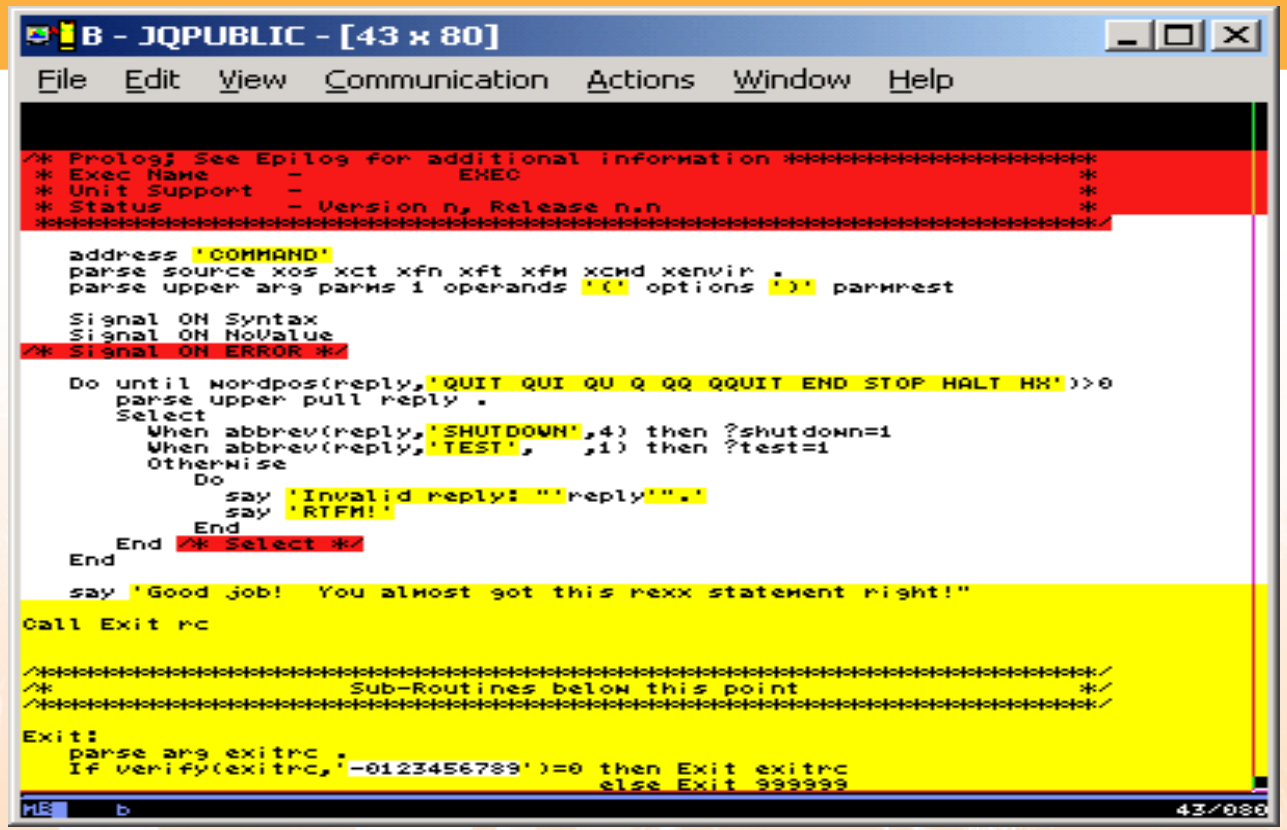
```
ALL / SELECT / | / DO / | / END /
```

```
         Do until ?AllDone

-------------------  2  line(s) not displayed
-------------------
         End /* until ?AllDone */

-------------------  7  line(s) not displayed

-------------------
```

Best practices:
REXX (religion)

QDI, John Hartmann's XEDIT Macro for Coloring Program Syntax Elements

- http://vm.marist.edu/~pipeline/#QDI



The "SYSTEM CONFIG" file;
"Record Qualifiers"…

- We'll go though "Record Qualifiers" quickly as it could be consider an "advanced" topic.
- But they are:
  - an important capability
  - is not obvious
  - and can be difficult to understand without an example…

The "SYSTEM CONFIG" file;
"Record Qualifiers"…

```
System_Identifier 2094 %%7777 yournode GATEWAY gw_name
```

- %% are wildcards, very important when running in an LPAR
- yournode is returned by the command: CP QUERY USERID
  - E.g. JQPUBLIC AT BIGBLUE
  - parse value diag(08,'QUERY USERID') with self . ConfigSysID . '15'x
  - Not to be confused by CMS command "IDENTIFY", which comes from the 'nodeid' defined in the "SYSTEM NETID S" file.
- **If you have other CPUs AT YOUR SITE upon which you might recover.**

```
System_Identifier 2094 %%0666 RECOVERY GATEWAY gw_name
```

- So your system EXECs can act differently at a Disaster Recovery site (and users can tell, too).

```
System_Identifier_Default     DISASTER GATEWAY gw_name
```

```
yournode: Timezone_Definition CST West 06.00.00
yournode: Timezone_Definition CDT West 05.00.00
RECOVERY: Timezone_Definition CST West 06.00.00
RECOVERY: Timezone_Definition CDT West 05.00.00

DISASTER: Timezone_Definition EST West 05.00.00 /* East-coast D.R. */
DISASTER: Timezone_Definition EDT West 04.00.00 /* East-coast D.R. */
```

The "SYSTEM CONFIG" file;
"Record Qualifiers"…

```
yournode: RECOVERY: ,    /* Devices "at home" and on other boxes "at home" */
    Rdevice  440-47F      Type UNSUPported DEVclass 3270_Display
DISASTER:  ,             /* Same hardware, different address at D.R. provider */
    Rdevice  540-57F      Type UNSUPported DEVclass 3270_Display
...
yournode: RECOVERY: ,
    Operator_Consoles ,
                06A0 , Esysop  */
                06A2 , Esysop2 */
                06A1 , PerfMon */
               . . .
                SYSTEM_3270 ,          /* Integrated 3270 console on the HMC  */
                SYSTEM_CONSOLE         /* HMC *and* 2nd Level Autolog support */

DISASTER: ,
    Operator_Consoles ,
              0009                                          ,  /* Level 2 Testsys   */
              00C0 00C1 00C2 00C3 00C4 00C5 00C6 00C7 ,  /* Disaster Recovery */
              00C8 00C9 00CA 00CB 00CC 00CD 00CE      ,
               00D0 00D1 00D2 00D3 00D4 00D5 00D6 00D7 ,
             ...
              SYSTEM_3270          ,     /* Integrated 3270 console on the HMC */
              SYSTEM_CONSOLE            /* HMC *and* 2nd Level Autolog support */
```

Miscellany:
"SYSTEM NETID S2" file

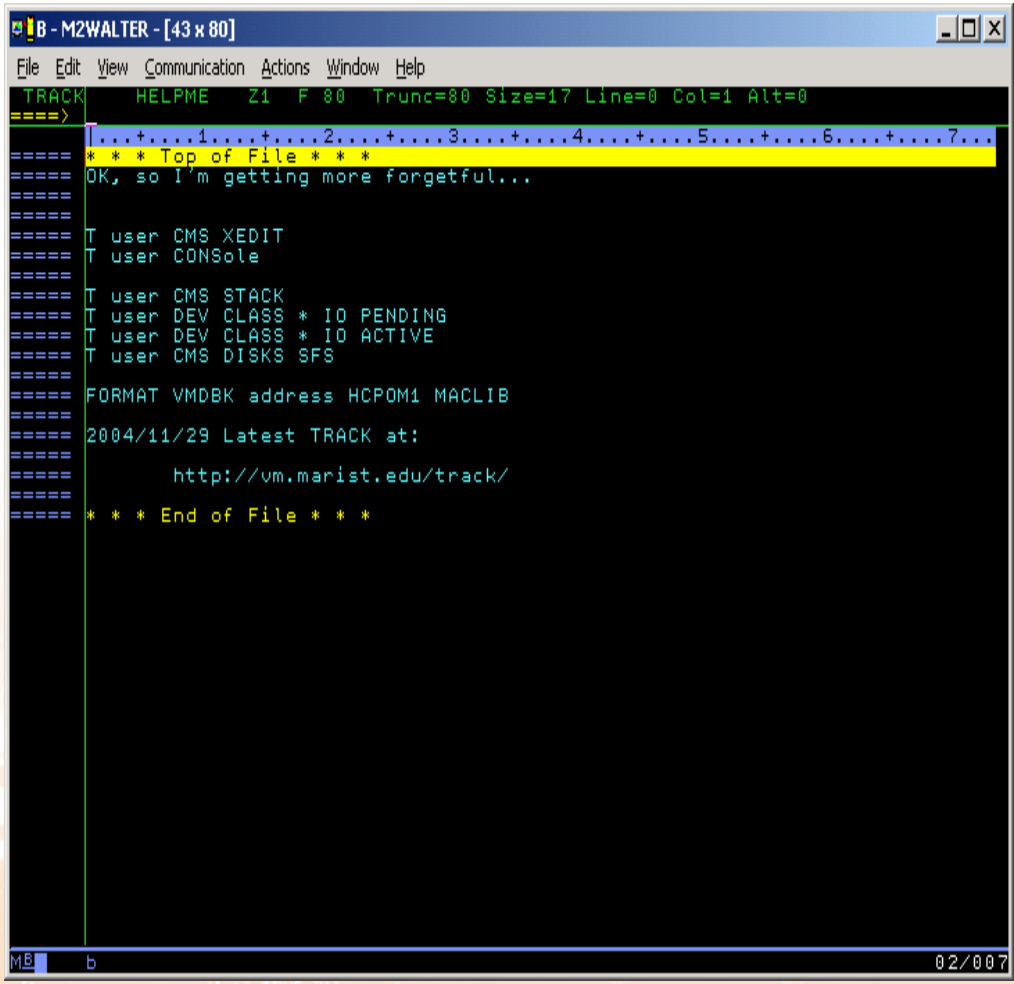
- The Effect of LPARs on the CPUID (note ***2nd*** digit)

```
*CPUID NODEID   NETID          (Note: SECOND digit is the LPAR number)
* IBM z800 2066-0B1, in LPAR 1 (Same as "Basic Mode" when on SN x17777)
017777 yournode RSCS
117777 yournode RSCS
217777 yournode RSCS
317777 yournode RSCS
…
F17777 yournode RSCS
* IBM z800 2066-0B1, in LPAR 1
017777 yournode RSCS
117777 yournode RSCS
217777 yournode RSCS
317777 yournode RSCS
…
F17777 yournode RSCS
* IBM z800 2066-0B1, in LPAR 2
027777 yournode RSCS
127777 yournode RSCS
227777 yournode RSCS
327777 yournode RSCS
…
F27777 yournode RSCS
```

Arrggghhh!
Q: How Am I Supposed To Remember All This *NEW STUFF*?

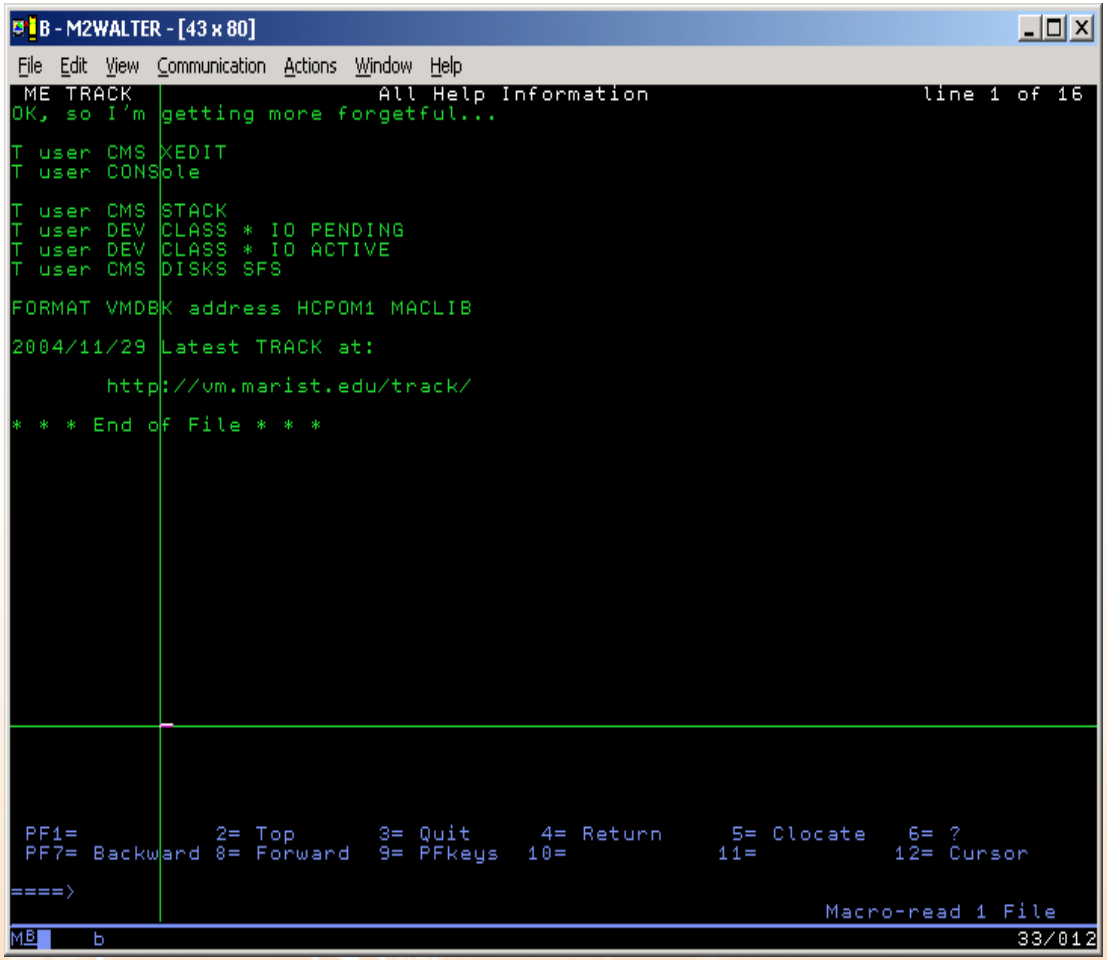
Don't try to remember everything – <u>just know where to look.</u>

- **Create "help me" files with often-used but hard-to-remember commands, and other details.**
- **Save the files on your own disk, or make them public.**
- **For example, since out VM system seldom has hung users, I forget the TRACK command to look for pending I/O on a given user.**
- **The file "TRACK HELPME" contains those commands.**



A: *Help yourself!*

- ***Just entering: HELP ME TRACK yields the clues I usually need.***
- ***Build your own "HELPME" library as-needed.***
- ***All that Linux for zSeries "stuff" is new to me, too.***
  - ***I expect to write lot of new HELPME files.***



Session Wrap-up

- Questions?
  - Later…about session materials, or in general:

Mike Walter
Hewitt Associates LLC
847.771.9233
Mike.Walter -- hewitt.com

- ***Please***, fill in the **bubbles** on your Session Evaluation Form ***COMPLETELY*** in **DARK BLUE** or **BLACK** ink.
- Help make this session better! – ***write your comments on the back of your form.***

```
/* Prolog; See Epilog for additional information ********************
 * Exec Name     - MKSALIPL EXEC                                    *
 * Unit Support  - OSS/VM                                           *
 * Status        - Version 1, Release 1.0                           *
 ********************************************************************/

   address 'COMMAND'
   parse source xos xct xfn xft xfm xcmd xenvir .
   parse upper arg parms 1 operands '(' options ')' parmrest

   Signal ON Syntax
   Signal ON NoValue
/* Signal ON ERROR */

   hi='1DE8'x                              /* 3270 Hilite Char     */
   lo='1D60'x                              /* 3270 Default Char    */
   parse var operands writevdev minivol volid errs
   If writevdev='?' then Signal Explain
   If errs<>'' then
      Do
        say xfn'; Invalid operands found: "'errs'".'
        Call Exit 20
      End

   If writevdev='' then
      writevdev='0F00'  /* Where to write SALIPL                   */
   extent=1             /* Which CP-fmt'd "PARM" extent from which  */
   If minivol='' then   /* Mdisk label at "extent" (e.g. vdev=CF1,  */
      minivol='NOVERIFY'/* label="MNTCF1") should be checked first. */
                        /* the "CPLOAD MODULE" should be loaded     */
   module='CPLOAD'      /* Default=CPLOAD, CP nucleus module to load*/
   offset=0             /* Default=0, must be 0 if "extent" is given*/
   origin=1000          /* Default=1000, address at which SALIPL    */
                        /* should load the "module".                */
   If volid='' then     /* Mdisk or CP label to be checked before   */
      volid='NOVERIFY'  /* write.                                   */

   iplparms=''          /* Typically entered at IPL time            */
   comments='?'
```

```
/* Exactly 4 lines of comments, truncated at 80 bytes            */
c.1='Some possible IPL PARAMETERS section (above) entries:'
c.2='CONS=ccuu          PROMPT               <--- Used most often'
c.3='NOEXITS            FN=system            FT=config'
c.4='PDNUM=ParmDiskNum  PDVOL=ParmDiskVolser  PDOFF=ParmDiskcylOffset'
c.0=4
 cmd='SALIPL' writevdev '(EXTENT' extent 'MINIVOL' minivol ,
     'MODULE' module 'ORIGIN' origin 'VOLID' volid ,
     'COMMENTS' comments
 Do forever
    say hi
    say 'The following command is about to be executed‘ lo
    say cmd
    say 'stacked Comments:'
   'PIPE STEM c. | CONS'
    say
    If minivol='NOVERIFY'
       then say 'Minidisk extent' extent '(e.g. MAINTs CF1) WILL' ,
                'NOT have its volser verified.'
       else say 'Minidisk extent' extent '(e.g. MAINTs CF1) WILL' ,
                'be verified as:' minivol
    If volid='NOVERIFY'
       then say 'The virtual device at "'writevdev'" WILL' ,
                'NOT be verified.'
       else say 'The virtual device at "'writevdev'" WILL' ,
                'be verified as:' volid
    say
    say hi
    say 'Continue? Enter Yes or No' lo
    parse upper pull ans .
    If abbrev('YES',ans,1) then Leave /* Forever */
    If ans='NO' | ans='N' then
       Do
         say 'Aborting before writing SALIPL per reply:' ans
         Call Exit 32
       End
    say
    say '+++ Invalid reply:' ans
 End /* forever */
'PIPE STEM c. | STACK'
 cmd
 Call Exit rc
```

```
Explain:
say xfn 'is used to write SALIPL to the a given address (usually a'
say 'full-pack extent minidisk.'
say
say '            +-0F00-+--+-NOVERIFY-+  +-NOVERIFY-+    '
say '>-MKSALIPL--+-vdev-+--+-minivol--+--+-volid----+--><'
say
say 'Example: MKSALIPL 123 MNTCF1 510RES'
say
Call Exit 4
/*********************************************************************/
/*                    Sub-Routines below this point                  */
/*********************************************************************/

Exit:
   parse arg exitrc .
   If verify(exitrc,'-0123456789')=0 then Exit exitrc
                                     else Exit 999999
Syntax:
   say '+++ Syntax error routine entered in:' xfn xft xfm
   say '+++ from line:' sigl', which reads:'
   say '+++'sourceline(sigl)
Call Exit 20

NoValue:
   say '+++ NoValue error routine entered in:' xfn xft xfm
   say '+++ from line:' sigl', which reads:'
   say '+++'sourceline(sigl)
Call Exit 24
/* Epilog ************************************************************
 * Function      - See 'EXPLAIN' subrtn above.                       *
 * Component of  - VM Sysprogs toolbox                               *
 * Command format- See 'Explain; subrtn above.                       *
 * Called by     - VM sysprogs                                       *
 * Program Lang. - CMS REXX                                          *
 * Date Written  - 20001117                                          *
 * Author        - Michael R. Walter                                 *
 * Acknowlegments- Based upon code the to the VMESA-L listserv       *
 *                 Thu, 31 Aug 2000 13:35:14 -0500                   *
 *                 "Frank M. Ramaekers Jr." <FrankRam@Earthlink.Net>*
 * Changed | By  | Description of Change                            *
 * --------+-----+------------------------------------------------- *
 * 20060101  mrw - Add 'volid' operands, improve 'Explain'.          *
 *********************************************************************/
```

```
/* Epilog *************************************************************
 * Function      - See 'EXPLAIN' subrtn above.                        *
 * Component of  - VM Sysprogs toolbox                                *
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 * --------+-----+------------------------------------------------- *
 * 20060101  mrw - Add 'volid' operands, improve 'Explain'.           *
 *                                                                    *
 ********************************************************************/
```

VM520 directory entry:

(A sample 1st level userid used to install and run 2nd level system)

```
USER VM520 xxxxxxxx 64M 2047M G 60
 ACCOUNT OVERHEAD 93S0
 MACH XA
 AUTOLOG VM520IPL                <============= Permit VM520IPL to XAUTOLOG this userid (VM520)

 IPL CMS PARM AUTOCR
 OPTION MAXCONN 2048 TODENABLE
 OPTION SVM QUICKDSP
 OPTION SVC76VM
 IUCV ANY
 CONSOLE 6A0 3215 C VM520IPL  <============= Permit VM520IPL to enter commands for this userid
 SPOOL 00C 2540 READER *              Requires "SYSTEM_CONSOLE" included in "SYSTEM CONFIG" statement
 SPOOL 00D 2540 PUNCH B               "Operator_Consoles"
 SPOOL 00E 3211 P
*
 LINK MAINT     190  190 RR
 LINK MAINT     19D  19D RR
 LINK MAINT     19E  19E RR
 LINK -VMT52A-  F00  280 MR
 LINK -VMT52B-  F00  288 MR
 LINK –VMR52A-  F00  28C RR
 LINK –VMR52B-  F00  28D RR

* R/O link to PP volumes
 LINK -VMPP01-  F00  301 RR
 ...
 LINK -VMPP06-  F00  306 RR

* TEST VM system volumes
 LINK -VMPPX1-  F00  307 MR
 LINK -VMPPX2-  F00  308 MR
 LINK -VMUDX1-  F00  309 MR
 LINK -VMUDX2-  F00  310 MR
 LINK -VMUDX3-  F00  311 MR
*LINK -VMSPX1-  F00  310 MR
*LINK -VMTDX1-  F00  311 MR
*LINK -VMPGX1-  F00  312 MR
```

VM520 directory entry, continued:

(A sample 1st level userid used to install and run 2nd level system)

```
* TEST VM User volumes
*LINK  -VMUT01-  F00  321  MR
...
*LINK  -VMUT05-  F00  32A  MR

* R/O link to 1st Level User volumes
 LINK  -VMU200-  F00  1200  RR
 LINK -VMU201-  F00  1201  RR
 ...
*
* Something to DIAL to  that won't try to come up as a VM:Operator console
 SPECIAL  610  3270
 SPECIAL  611  3270
 ...
 SPECIAL  62F  3270

*SPECIAL  6A0  3270  defined as CONSOLE above
 SPECIAL  6A1  3270
 ...
 SPECIAL  6CF  3270
*
MDISK  0191  3390-3  1812  2  VMPP0 4 MR
```