

Session B54

The Basics of Using z/VM

Christine Casey

Brian Hugenbruch

z/VM Development - Endicott, NY

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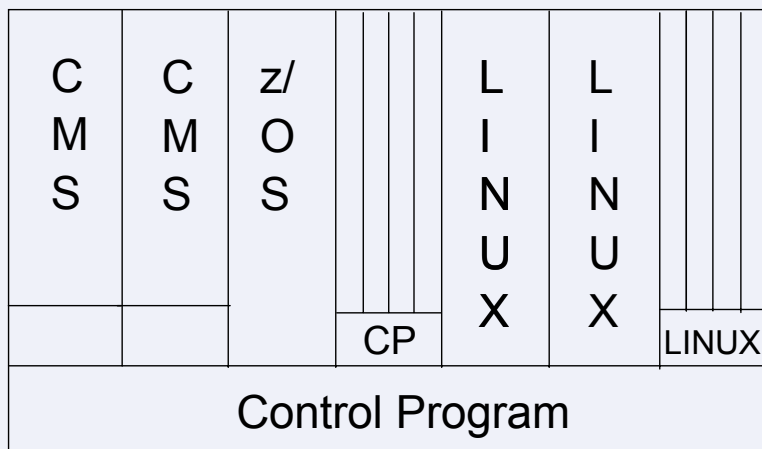
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Agenda

- Overview
- General Concepts
 - ▶ Establishing VM Sessions
 - ▶ Logging onto the Virtual Console
 - ▶ User Directory
 - ▶ Execution Modes
- Using CMS
 - ▶ Commands
 - ▶ CMS File System
 - ▶ Developing Programs - Xedit, Execs, Pipelines...
- Debugging

Overview

- VM contains Two Basic Parts
 - ▶ CP - Control Program
 - ▶ CMS (or Guests LINUX, CP, z/OS, etc.)



CMS General Concepts

- CMS: Conversational Monitor System
- CMS is an interactive user interface that runs under the control of CP
- Provides an application programming and execution environment
 - ▶ Commands, EXECs (scripts), pipelines, Xedit, compilers, user programs
- Many tools available
 - ▶ Productivity Aids, REXX, Vendor programs

CMS Strengths

- User-friendly
 - English-like, extensible command language
 - Simple, easy-to-use file system
- Cooperates well with CP
 - ▶ Commands to exploit CP function and devices
 - ▶ Exploits virtual machine concepts
 - ▶ Commands can be automatically passed to CP:
 - If not found in CMS, or directly by issuing #CP command
- High performance
 - ▶ Single-user orientation
 - ▶ Shared CMS Nucleus, DCSS (Discontiguous Saved Segment)
 - ▶ File system performance

Environments

- CMS
 - ▶ IPL CMS or Begin, run Profile Exec
 - ▶ Linemode or Fullscreen mode
 - XEDIT Environment
 - ▶ XEDIT *fn ft fm*, run Profile Xedit
 - ▶ CMS Subset mode
 - Unix-like
 - ▶ Open Extensions (Posix Shell & Utilities) *
 - ▶ Byte File System, Network File System
 - z/OS-like or VSE-like
 - ▶ OS Simulation *
 - ▶ DOS Simulation *
- * not a full duplication of function

Establishing a VM Session

- VM Logo Screen
 - ▶ One at a time - 3270 emulation (pcom)
 - ▶ LOGON ... here -> move a signon to another session
 - ▶ LOGON ... by ... -> signon using another password

- Using CP to control the Virtual Machine
 - ▶ #CP IPL CMS - restart your entire CMS session
 - profile exec runs to customize your session
 - ▶ #CP LOGOFF - logon xxx - sign off/on

VM Logo Screen

```

Session A - [24 x 80]
File Edit View Communication Actions Window Help
z/VM ONLINE

                          Use Of This System Is For
                          IBM Management Approved Purposes Only

=====  =====  =====  =====
=====  =====  =====  =====
===      ==      ==      =====  =====
===      =====  =====  =====
===      =====  =====  =====
===      ==      ==      =====  =====
=====  =====  =====  =====
=====  =====  =====  =====

      For help call the Customer Service Center:
                        888-IBM-HELP
VTAM Customers: To exit screen, enter VMEXIT

Fill in your USERID and PASSWORD and press ENTER
(Your password will not appear when you type it)
USERID  ==>
PASSWORD ==>
COMMAND ==>

                                         RUNNING  GDLVM7
-----
M  a                                         20/016
-----
Connected to remote server/host GDLVM7.endicott.ibm.com using port 23
My Printer on LPT1:
  
```

Sample User Directory

USER IBMUSER IBMUSER 16M 16M G
ACCOUNT SYSTEMS
MACH XA
IPL CMS



CONSOLE 009 3215
SPOOL 00C 2540 READER *
SPOOL 00D 2540 PUNCH A
SPOOL 00E 1403 A

LINK MAINT 0190 0190 RR * CMS system disk
LINK MAINT 019E 019E RR * Product code disk
LINK 5767002P 29E 29E RR
LINK 5767002P 505 305 RR
LINK 5767002P 191 192 RR
MDISK 191 3390 1535 001 510RES MR READ WRITE MULTIPLE

Sessions

Session B - [24 x 80]
 File Edit View Communication Actions Window Help
 Ready;
 —
 RUNNING GDLVM7
 b 23/001
 Connected to remote server/host GDLVM7.endicott.ibm.com using port 23
 My Printer on LPT1:

Execution Modes



- Status appears at the bottom right of screen
 - ▶ CP Read (CP is waiting for a command)
 - ▶ VM Read (CMS is waiting for a command)
 - ▶ Running (Ready for cmds or working on some)
 - ▶ More... (More info than can fit on the screen)
 - 50 seconds then beep then 10 seconds
 - Determine setting: Query Term
 - Page without waiting: Term More 0 0
 - ▶ Holding (Waiting for you to clear the screen)
 - ▶ Not Accepted (Too many commands in buffer; wait for executing command to complete)

CMS Commands

- Handles a system of files: (create, modify, debug)
- Many language processors/compilers can run under CMS
- Commands are blank-delimited
- Input accepted in ANY case
 - ▶ CMS will automatically uppercase and pass to command parser
- General syntax:


```
Command name [operand(s)...] [ (options.... [ ] ) ]
```

 - ▶ Examples:


```
copy Profile Exec A = = C
LISTFILE ( Date
Rdlist
```
- SET DOS On command simulates a VSE (DOS) environment

CMS Commands

- Command Search Order
 - ▶ When a command is entered, CMS has to locate it
 - ▶ Search for an EXEC with the specified command name
 - EXECs in storage
 - Command name with Filetype EXEC on accessed disk or directory (A-Z)
 - ▶ Search for translation or synonym
 - ▶ Search for a module with the specified command name
 - Nucleus extension, transient area, nucleus resident, on accessed disk/directory
 - ▶ If Command not found in CMS, it will be passed to CP for execution unless SET IMPCP is OFF (Implied CP)

CMS Commands

- Immediate Commands
 - ▶ Can be entered while another command is running
 - ▶ Interrupts the running command and executes immediately
 - ▶ 10 system immediate commands:
HB, HI, HO, HT, HX, RT, RO, SO, TE, TS
 - ▶ User's can define their own immediate commands
 - IMMCMD Macro from an Assembler program
 - IMMCMD Command from an EXEC
 - IMMCMD option on NUCXLOAD command

CMS File System

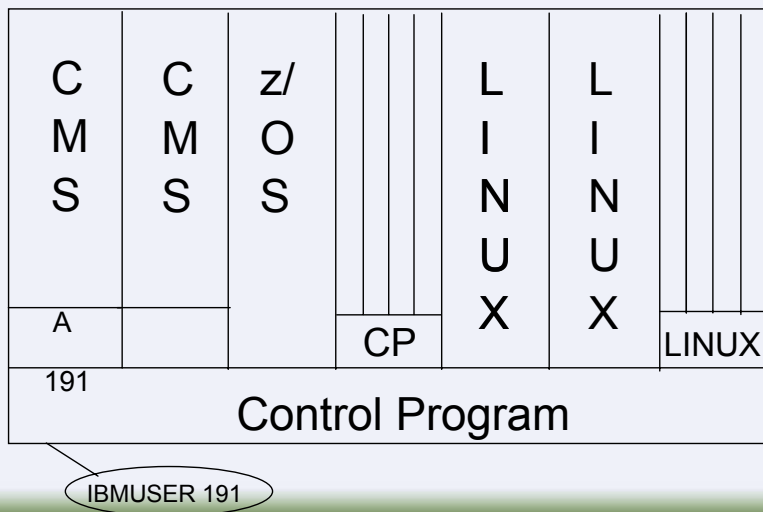
- CMS files are unique and generally cannot be read or written by other operating systems
- Files are named using a file identifier (file ID) consisting of 3 fields:
 - ▶ File name (FN)
 - ▶ File type (FT)
 - ▶ File mode (FM) or Directory name (dirname)
 - file mode letter A-Z where minidisk or directory resides, established by ACCESS command
 - file mode number 0-6 assigned when file is created or renamed (default = 1), used to identify or operate on a subset of files

CMS File System

- Files can be stored in several ways:
 - ▶ On Minidisks (fn ft fm)
 - Standard file modes: A - user's disk, S - system disk, Y/S - installed programs
 - ▶ In an SFS (Shared File System) filespace:
(GPLSRV2:CASEY.SSL.C.EXAMPLES)
 - ▶ On the BFS (Byte File System) (/home/userid/...)
 - hierarchical file structure
 - ▶ In NFS (Network File System)

CMS Minidisks

- CMS User, Link 191 minidisk, Access as A



Sample User Directory

USER IBMUSER IBMUSER 16M 16M G
 ACCOUNT SYSTEMS
 MACH XA
 IPL CMS

CONSOLE 009 3215
 SPOOL 00C 2540 READER *
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MDISK 191 3390 1535 001 510RES MR READ WRITE MULTIPLE



File system - Minidisks

- A location on real DASD which has been allocated for storage of a user's files
- 3 types of minidisks:
 - ▶ Permanent
 - lasts across sessions (logons); defined in directory
 - ▶ Temporary (T-disks)
 - are destroyed at logoff
 - use CP DEFINE command or attach by operator
 - ▶ Virtual disks in storage (V-disks)
 - temporary simulations of minidisks in system storage
 - not allocated on real DASD; avoids I/O overhead

File system - Disk Commands

- CP DEFINE, CP LINK, CMS ACCESS
 - ▶ Defines a virtual device or virtual disk in storage
 - **DEFINE t3380 as 291 cyl 10**
 - ▶ Link to other user's minidisks to share files
 - LINK caseyct 191 291 rr
 - ▶ Once linked, a disk can be accessed
 - ACCESS 291 c
- FORMAT
 - ▶ **Minidisks must be formatted before using the first time**
 - FORMAT 291 c

Disk Commands (cont.)...

- **RELEASE, CP DETACH**
 - ▶ Release frees an accessed disk
 - Release c
 - ▶ Detach removes the device from your VM configuration
 - Detach 291 -or- Release c (detach)
- **CP QUERY DASD**
 - ▶ Shows what you have linked; displays status
- **Q ACCESSED, Q DISK, Q SEARCH**
 - ▶ Shows various status information for accessed disks/directories
- **LISTFILE, FILELIST**
 - ▶ Lists the files on an accessed minidisk or directory

Developing Programs

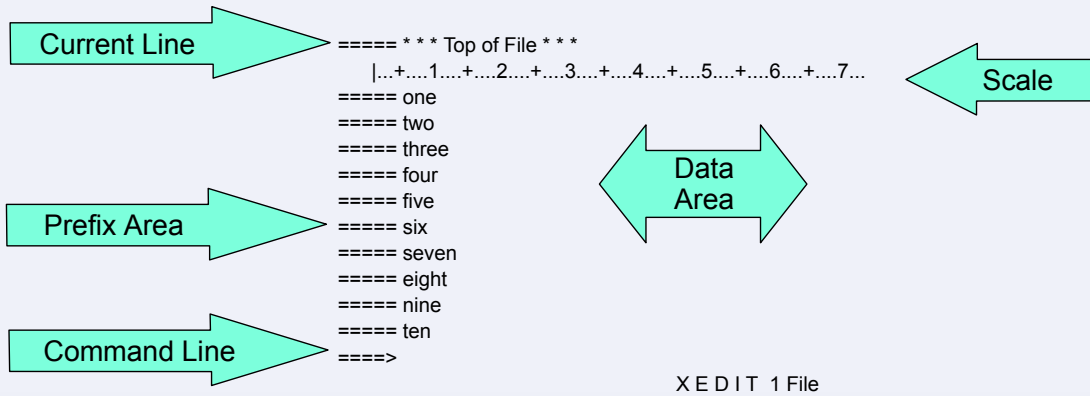
- **Creating and Compiling**
 - ▶ Use XEDIT to create the program like any other file
 - ▶ Filetype indicates name of programming language you are using
 - Assemble, Fortran, C, Cobol, PLI, etc.
 - ▶ Invoke the compiler by typing compiler name followed by File name of the program
 - ▶ **LISTING and TEXT files are produced**
 - example: `ASSEMBLE ASM1` result: `ASM1 LISTING`
`ASM1 TEXT`



XEDIT

- Command: Xedit fn ft fm
- Each line is a record
- Screen Layout:

TEST FILE A1 F 80 Trunc=80 Size=45 Line=0 Col=1 Alt=0



XEDIT

- Prefix Commands (subset)
 - m, mm mm - move
 - c, cc cc - copy
 - f - following
 - p - preceding
 - a - add
 - si - sequential insert
 - d, dd dd - delete
 - ", "" "" - repeat

XEDIT

- Command line commands
 - ▶ screen format
 - ▶ change /xxx/yyy/ * *
 - ▶ /zzz/ (find zzz in text)
 - ▶ all /zzz/ (find all zzz at once)

- Ending
 - ▶ QQuit - leave and doesn't save changes
 - ▶ SAVE - doesn't leave, but does save changes
 - ▶ FILE - leave and save changes

XEDIT

- Write your own command
 - ▶ Name: yourcmdn XEDIT
 - ▶ Write using REXX
 - ▶ Use: EXTRACT to get session information
 - ▶ Can use Pipelines

XEDIT

■ Default Program Function Keys

- PF1 BEFORE HELP MENU
- PF2 BEFORE SOS LINEADD
- PF3 BEFORE QUIT
- PF4 BEFORE TABKEY
- PF5 BEFORE SCHANGE 6
- PF6 ONLY ?
- PF7 BEFORE BACKWARD
- PF8 BEFORE FORWARD
- PF9 ONLY =
- PF10 BEFORE RGTLEFT
- PF11 BEFORE SPLTJOIN
- PF12 BEFORE CURSOR HOME

XEDIT

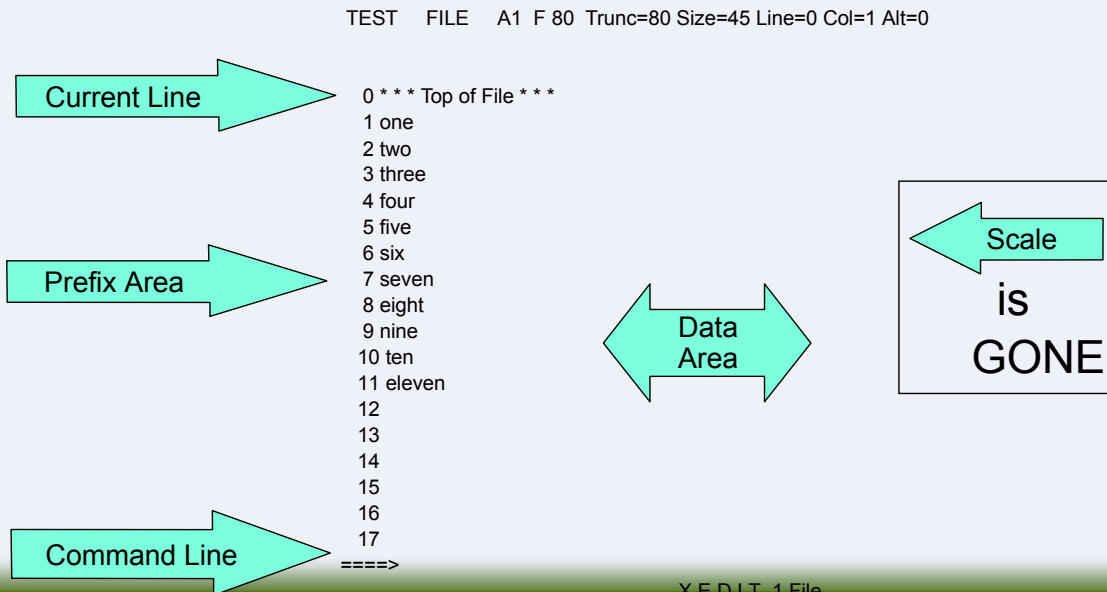
- PROFILE XEDIT runs when XEDIT is invoked
- Sample: PROFILE XEDIT

```
/* PROFILE XEDIT */  
'SET VERIFY OFF 1 72'  
'SET NUMBER ON'  
'SET PREFIX NULL'  
'SET CASE MIXED IGNORE'  
'SET CURLINE ON 4'  
'SET SCALE OFF'  
'SET AUTOSAVE 1'
```

- Note: Xedit is very tailorable !

XEDIT

■ New Screen Layout



XEDIT

■ ISPF prefixes - PROFILE XEDIT

```

/* to mimic ISPF          */
'SET PREFIX SYNONYM B P   '
'SET PREFIX SYNONYM A F   '
'SET PREFIX SYNONYM R "   '
'SET PREFIX SYNONYM RR "" '

```


EXECs

- Types: EXEC, EXEC2, and REXX
- REXX
 - ▶ /* starts with a comment */
 - ▶ Contains Variables and Stemmed Arrays
 - Stores Strings and Numbers as strings
 - ▶ Has 'flow control'
 - do and do while
 - if then else
 - select
 - interpret
 - ▶ Allows Functions and Procedures
 - ▶ Issues CP/CMS commands (in quotes)

EXECs

- PROFILE EXEC runs when you sign on

```
/* Profile Exec Sample */
'SYNONYM HUGENBRU SYNONYM
A'
'CP SPOOL CONS * START'
'CP TRACE END'
'CP SET MSG ON'
'CP SET PF12 RET'
```

```
HUGENBRU SYNONYM A
0 * * * Top of File * * *
1  RECEIVE  REC    3
2 * * * End of File * * *
```

Pipelines

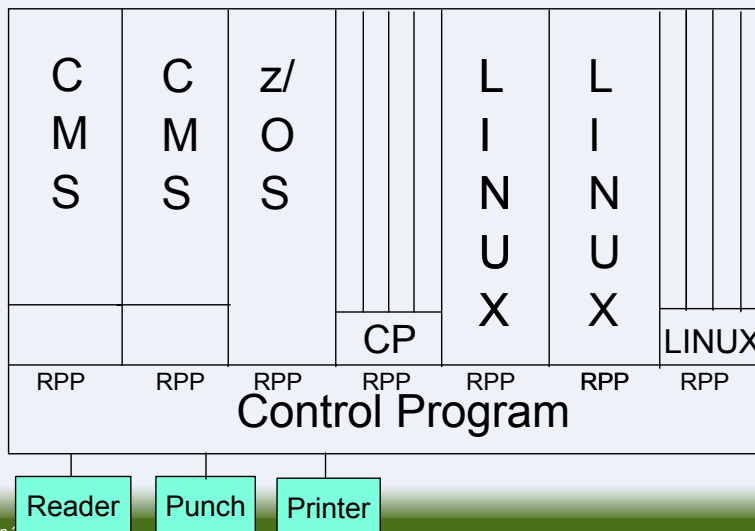
- CMS command
- Several Programs (stages) pass records
- Many sources for data
 - ▶ commands
 - ▶ xedit
 - ▶ disks
 - ▶ storage, etc.
- Example:


```

            'pipe ',
            '| < my data a',
            '| locate /my line/',
            '| > mynew data a'
```

Spool Devices

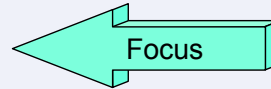
- Reader, Printer, Punch



Sample User Directory

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 LINK 5767002P 191 192 RR
 MDISK 191 3390 1535 001 510RES MR READ WRITE MULTIPLE

Debugging

- Record your console
 - spool console to * start (to start recording)
 - ... (do work)
 - spool console stop close (console punched to reader)
 - query reader all (to get the spool id)
 - rdrlist
 - peek {spool id} (for * (to look at the console)
 - receive {spool id} fn ft fm (to save console in a file)

Debugging

- Tracing
 - trace i r12345.10
 - trace instructions @ location 12345 for x'10' bytes
 - display g (display general registers)
 - d t12345.20 (display translated storage for x20)
 - b (begin execution)
 - trace end (end tracing)

- Dumps
 - VMDUMP
 - VM Dump Tool

References

- VM Library
 - ▶ <http://www.vm.ibm.com/library>

- XEDIT Tutorial
 - ▶ <http://www.vm.ibm.com/tutorial>

- HELP Facility
 - ▶ HELP command
 - ▶ HELP msg DMSxxxE
 - ▶ CP Link MAINT 19D 19D rr
 - link for HELP disk

Development Contacts

■ Brian Hugenbruch

- Phone: (607) 429-3660
- Internet: BWHUGEN@US.IBM.COM
- Postal mail
 - IBM Department G32G
 - 1701 North Street
 - Endicott, NY 13760 U.S.A.

■ Christine Casey

- Phone: (607) 429-3434
- Internet: CASEYCT@US.IBM.COM
- Postal mail
 - IBM Department G32G
 - 1701 North Street
 - Endicott, NY 13760 U.S.A.