

V04 The Basics of Using z/VM

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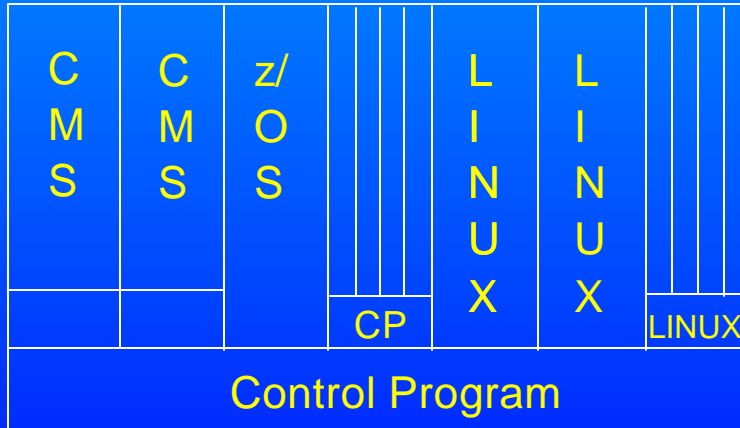
Agenda

- **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**

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Overview

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



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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**

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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

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Environments

- **CMS**
 - ▶ IPL CMS or Begin, run Profile Exec
 - ▶ Linemode or Fullscreen mode
 - **XEDIT Environment**
 - ▶ XEDIT *fn.ft.fn*, 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

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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

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VM Logo Screen

```
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
-----
MR | a |                                     20/016
-----
Connected to remote server/host GDLVM7.endicott.ibm.com using port 22
My Printer on LPT1:
```

User Directory

- ▶ Describes to CP the configuration and operating characteristics of each virtual machine
- ▶ During initialization, CP checks for an object directory on SYSRES and makes it active
- ▶ May be created or updated manually or using a directory manager, such as DirMaint
 - Manually using Xedit from user ID with privilege class A, B, or C
 - Use DIRECTXA utility to run the directory-creating program and bring it online.

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Sample User Directory

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

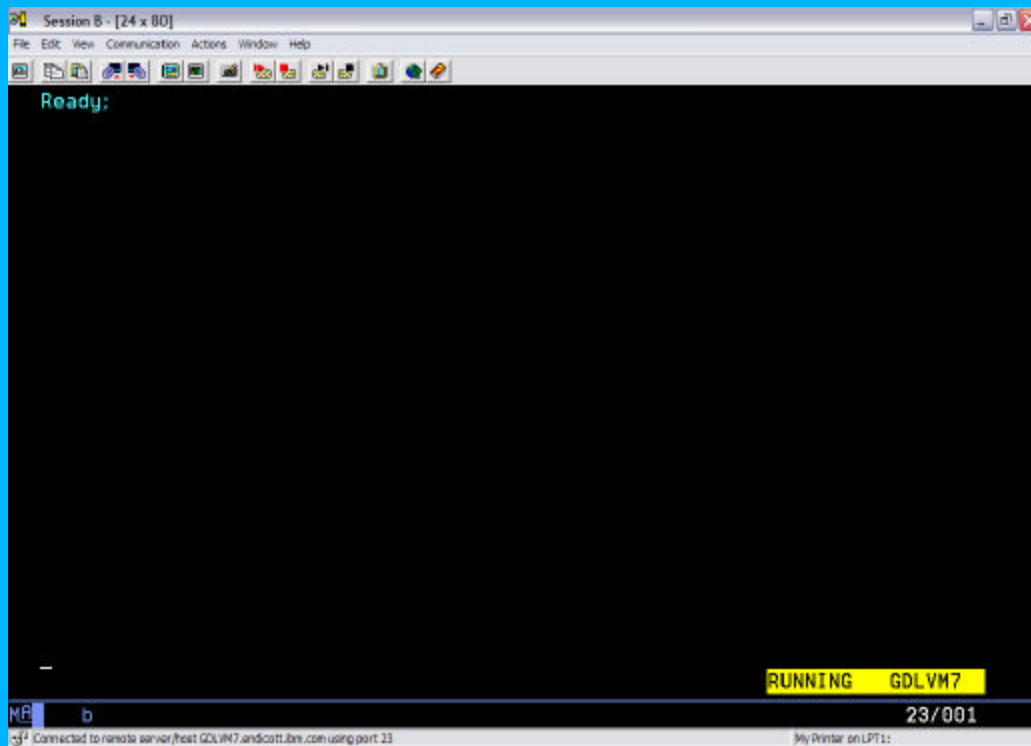
CONSOLE 009 3215
SPOOL 00C 2540 READER *
SPOOL 00D 2540 PUNCH A
SPOOL 00E 1403 A

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



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Sessions



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 and is waiting to be displayed)
 - **Default 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

- Allow you to create, modify, debug, and in general handle a system of files
- Many language processors/compiler 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
Rdrlist
- Some commands can simulate a VSE (DOS) environment
 - ▶ SET DOS On

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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)

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CMS Commands

■ Immediate Commands

- ▶ Can be entered while another command is running
- ▶ Interrupts the running command and is executed 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

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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

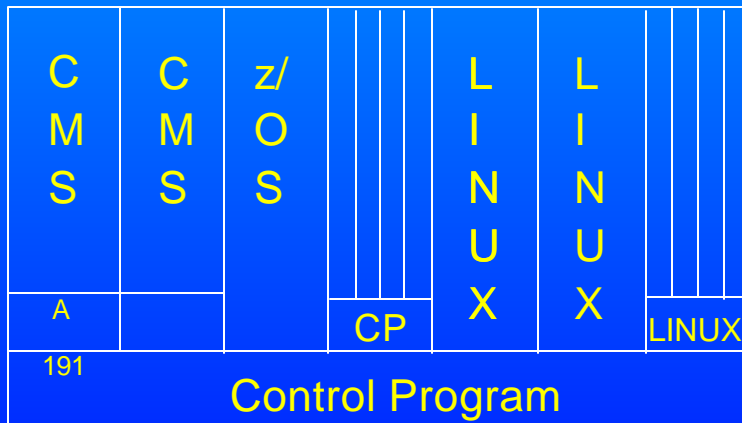
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CMS File System

- 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) filesystem: (GPLSRV2:RODEN.SSL.C.EXAMPLES)
 - ▶ On the BFS (Byte File System) (/home/userid/...)
 - hierarchical file structure
 - ▶ In NFS (Network File System)

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CMS Minidisks



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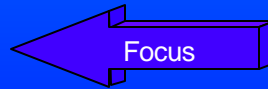
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Sample User Directory

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
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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



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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**
 - temporary simulations of minidisks in system storage, not allocated on real DASD.
 - avoids I/O overhead of writing to DASD

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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**

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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

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Developing Programs

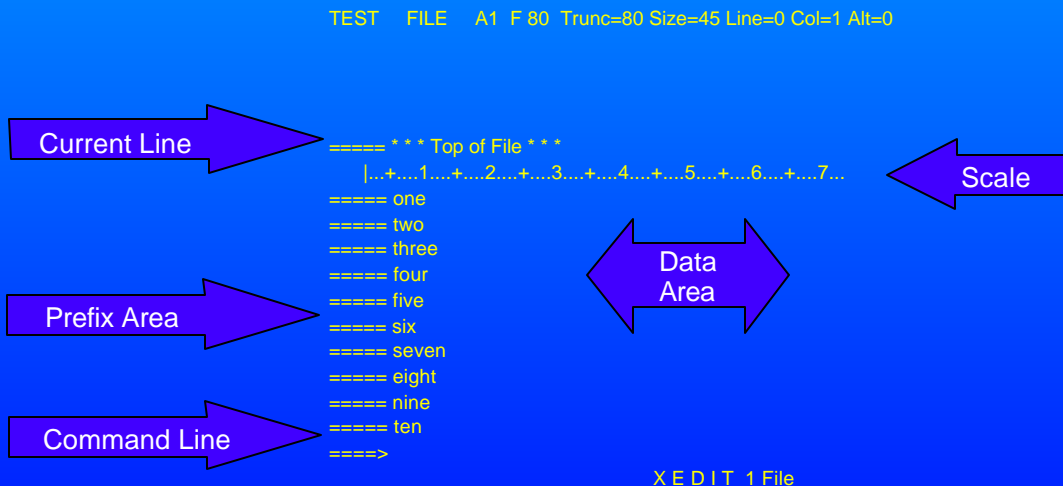
- **Creating and Compiling**
 - ▶ Use **XEDIT** to create the program like any other file
 - ▶ **Filetype** indicates name of programming language you are using
 - Assemble, Fortran, C, Cobol, PLI, etc.
 - ▶ Invoke the compiler by typing compiler name followed by **File name of the program**
 - ▶ **LISTING**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

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XEDIT

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



XEDIT 1 File

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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

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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

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XEDIT

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

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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**

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XEDIT

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

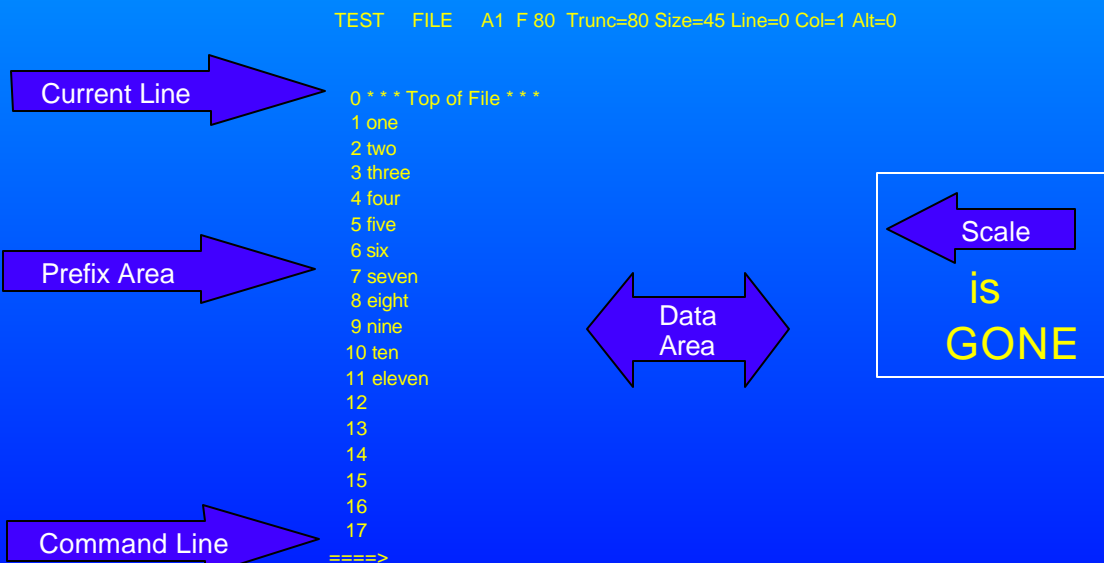
```
/* PROFILE XEDIT */  
'SET VERIFY OFF 1 72'  
'SET NUMBER ON'  
'SET PREFIX NULL'  
'SET CASE MIXED IGNORE'  
'SET CURLINE ON 4'  
'SET SCALE OFF'  
'SET AUTOSAVE 1'
```

- **Note: Xedit is very tailorable !**

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XEDIT

- **New Screen Layout**



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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 "'  '
```

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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)**

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EXECs

- **PROFILE EXEC** runs when you sign on

```
/* Profile Exec Sample */
```

```
'SYNONYM RODEN SYNONYM A'
```

```
'CP SPOOL CONS * START'
```

```
'CP TRACE END'
```

```
'CP SET MSG ON'
```

```
'CP SET PF12 RET'
```

```
RODEN SYNONYM A
```

```
0 * * * Top of File * * *
```

```
1 RECEIVE REC 3
```

```
2 * * * End of File * * *
```

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Pipelines

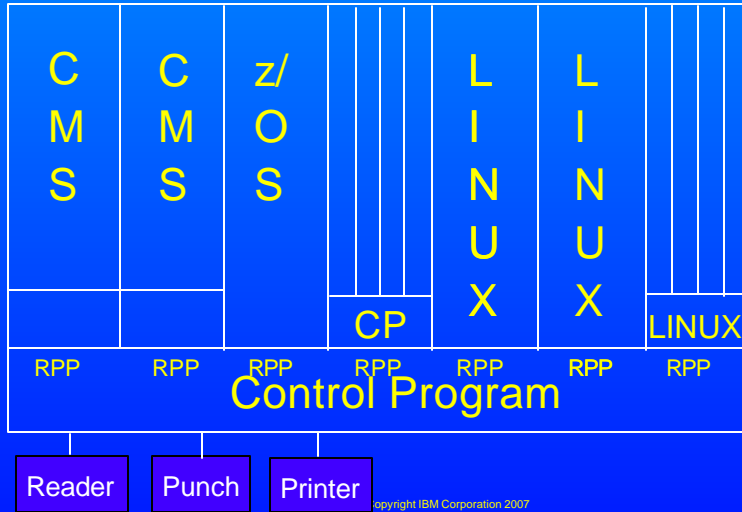
- **CMS command**
- **Several Programs (stages) pass records**
- **Many sources for data**
 - ▶ commands
 - ▶ xedit
 - ▶ disks
 - ▶ storage, etc.
- **Example:**

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

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Spool Devices

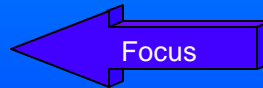
Reader, Printer, Punch



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

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Debugging

■ Record your console

- spool console to * start (to start recording)
- ... (do work)
- spool console stop close (console punched to your rdr)
- 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)

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Debugging

■ Tracing

- trace i r12345.10
 - trace instructions @ location 12345 for x10 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

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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

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