Session B34

The Basics of Using z/VM

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zSeries® EXPO
FEATURING Z/OS, Z/VM, Z/VSE
AND LINUX ON ZSERIES

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RETURN TO INDEX

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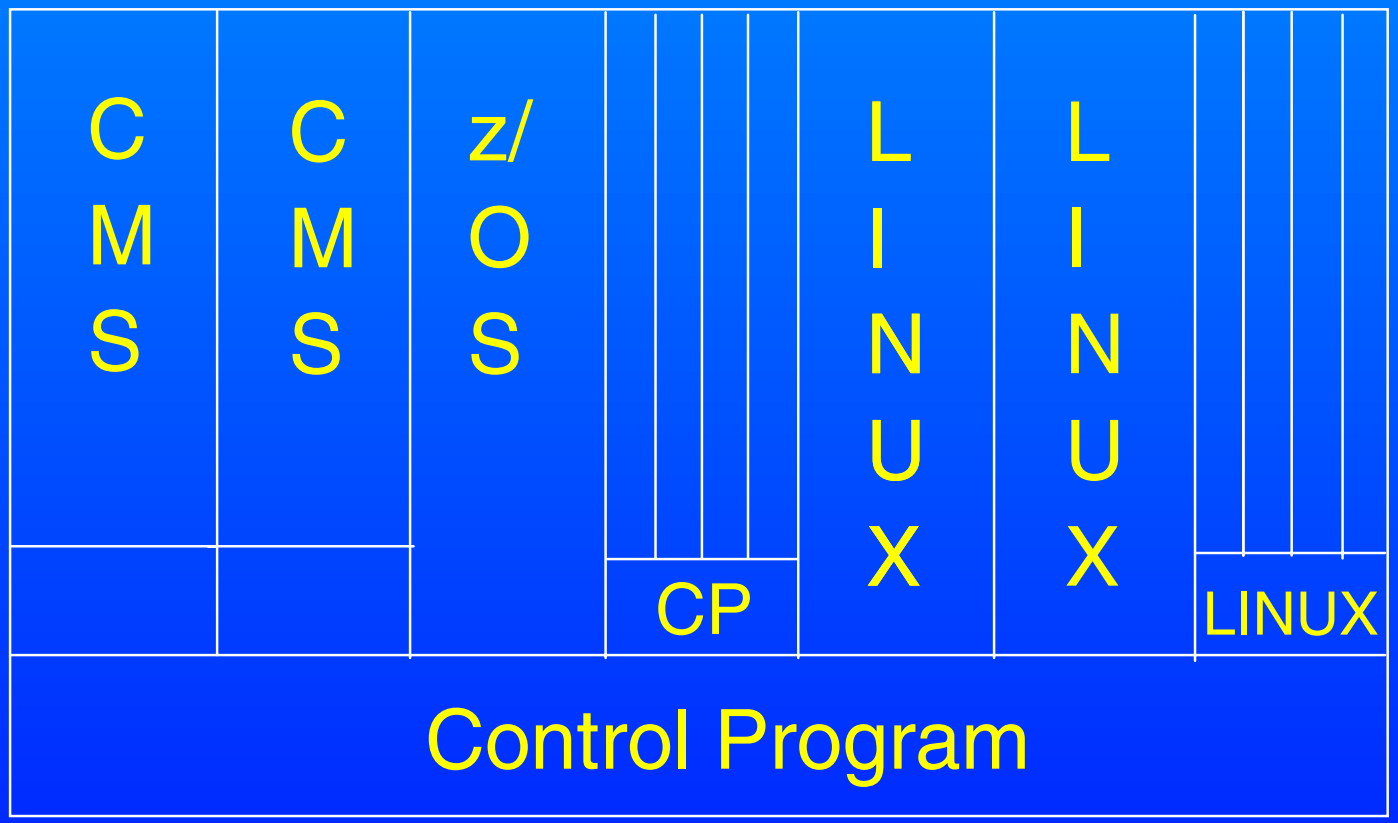
Agenda

- 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
  - File system performance

Environments

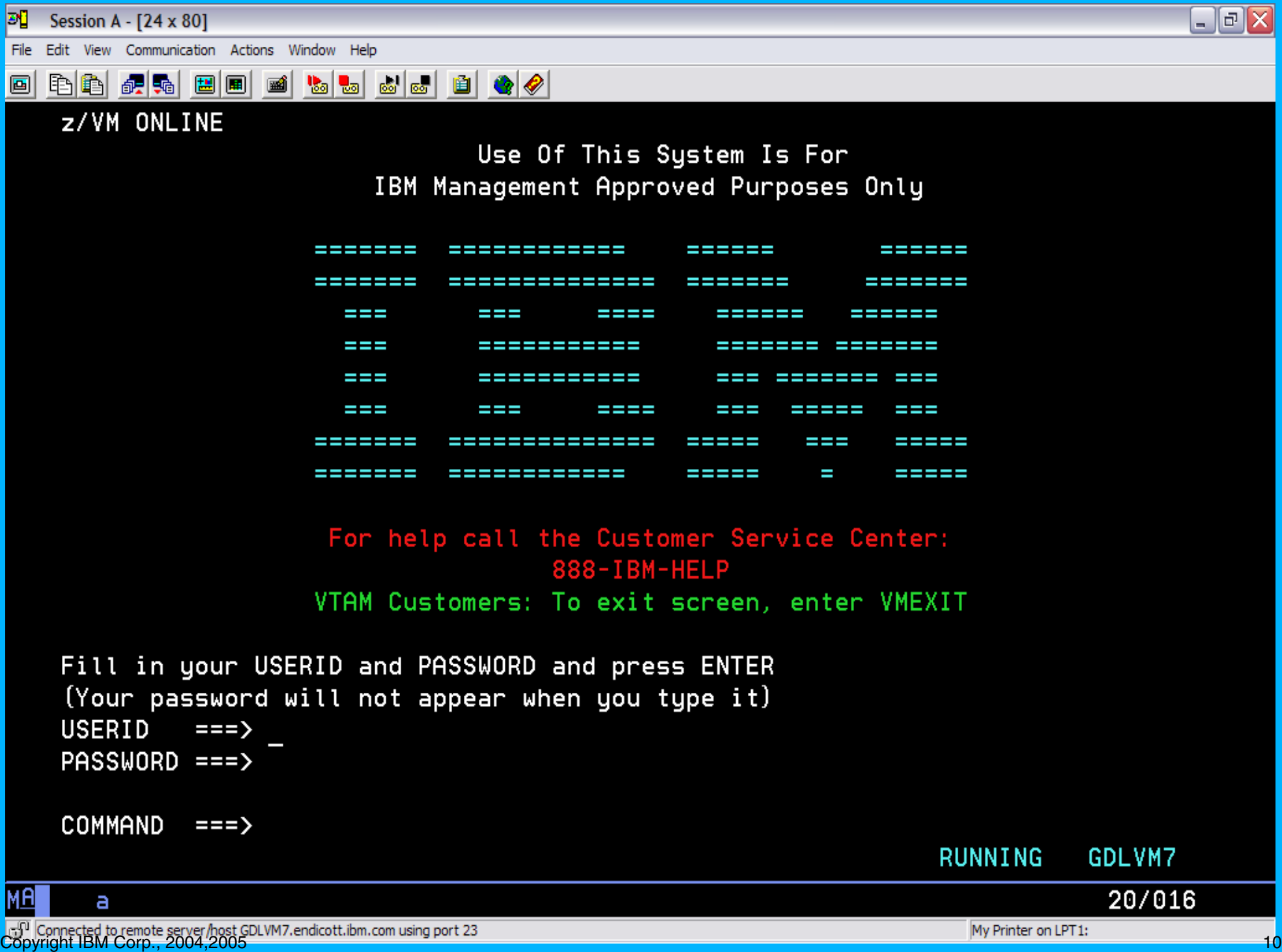
- CMS
  - IPL CMS or Begin, run Profile Exec
  - Linemode or Fullscreen mode
- XEDIT Environment
  - XEDIT *fn ft fm,* run Profile Xedit
  - CMS Subset mode
- Unix-like
  - Open Extensions (Posix Shell & Utilities) *
  - Byte File System, Network File System
- z/OS-like or VSE-like
  - OS Simulation *
  - 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



User Directory

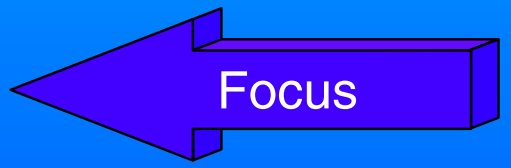
- Describes to CP the configuration and operating characteristics of each virtual machine
- During initialization, CP checks for an object directory on SYSRES and makes it active
- May be created or updated manually or using a directory manager, such as DirMaint
  - Manually using Xedit from user ID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

Sample User Directory

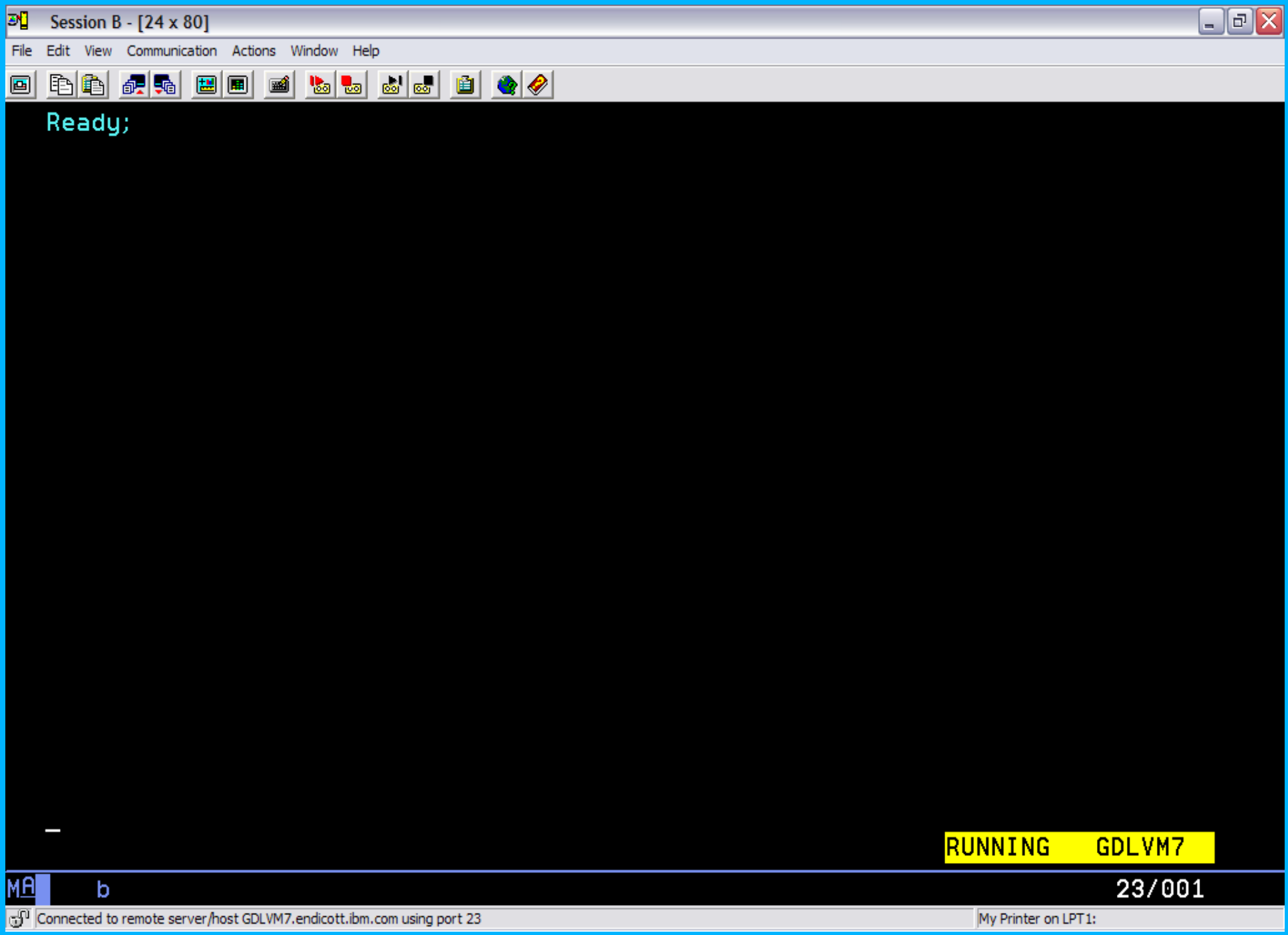
```
USER IBMUSER IBMUSER 16M 16M G
 ACCOUNT SYSTEMS
 MACH XA
 IPL CMS

 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



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/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
    Rdrlist
- Some commands can simulate a VSE (DOS) environment
  - ► SET DOS On

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 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

CMS File System

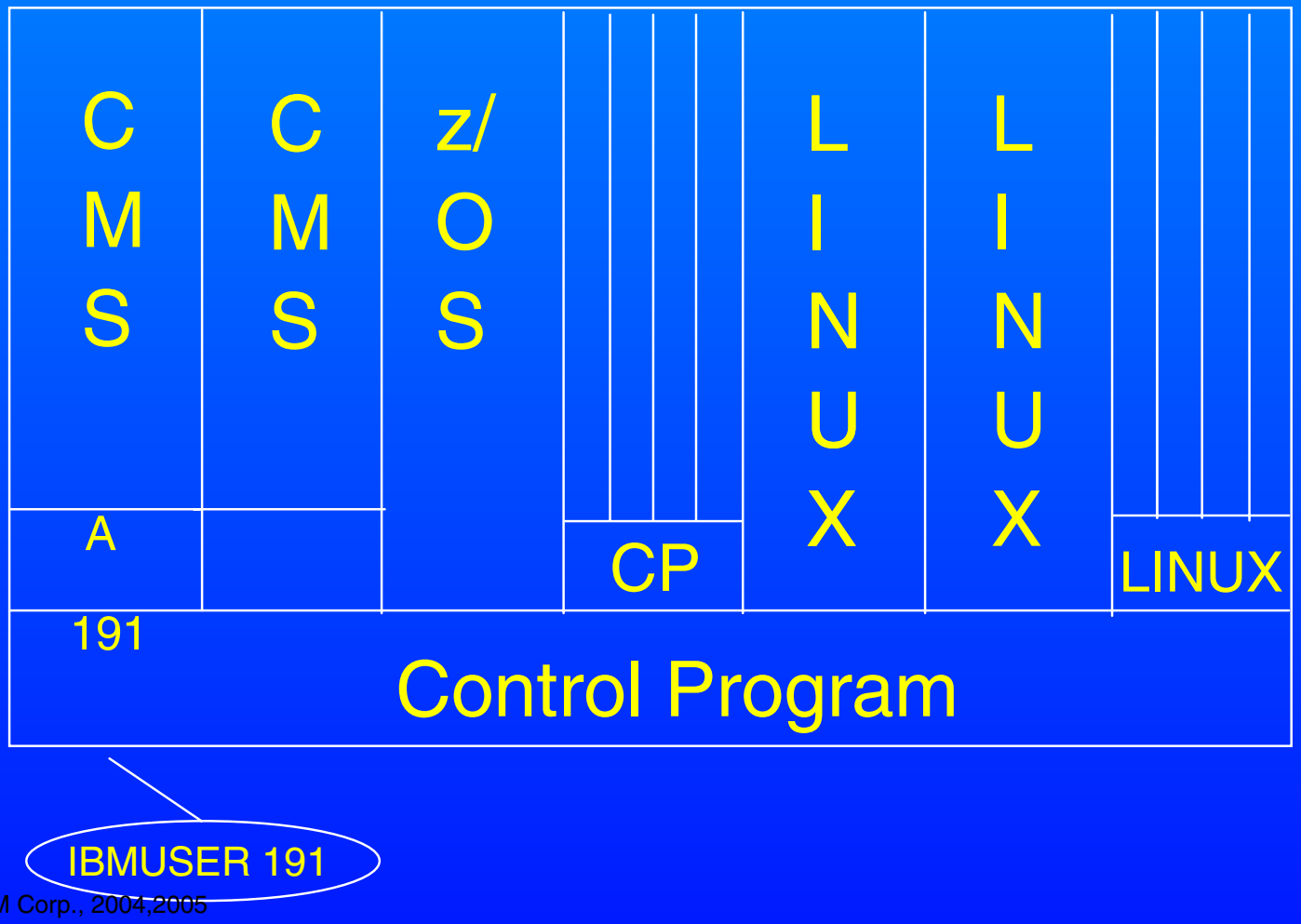
- CMS files are unique and generally cannot be read or written by other operating systems

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

CMS Minidisks



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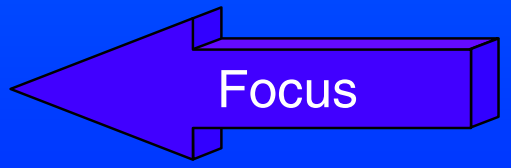


File system - Minidisks

- 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

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

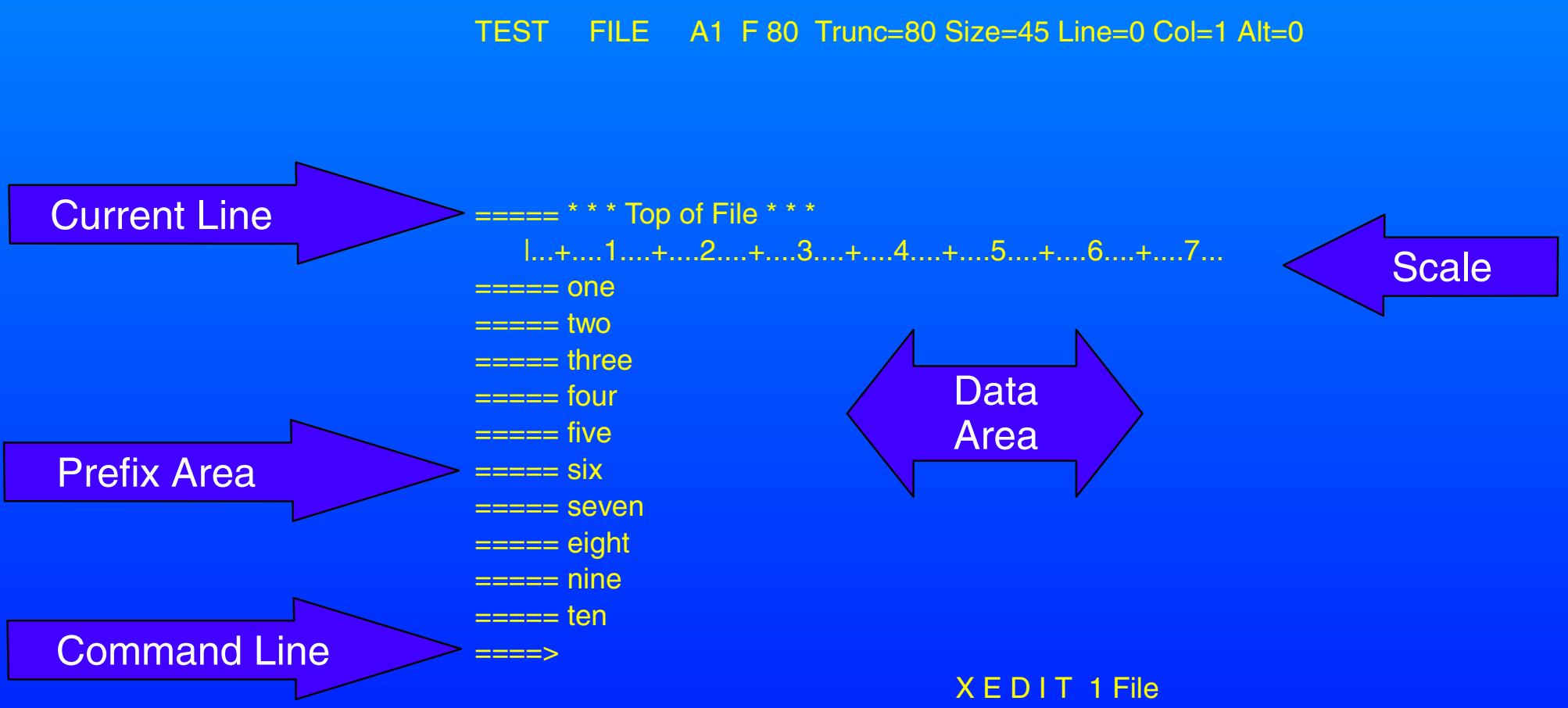
Developing Programs

- 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

- Each line is a record
- Screen Layout:



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

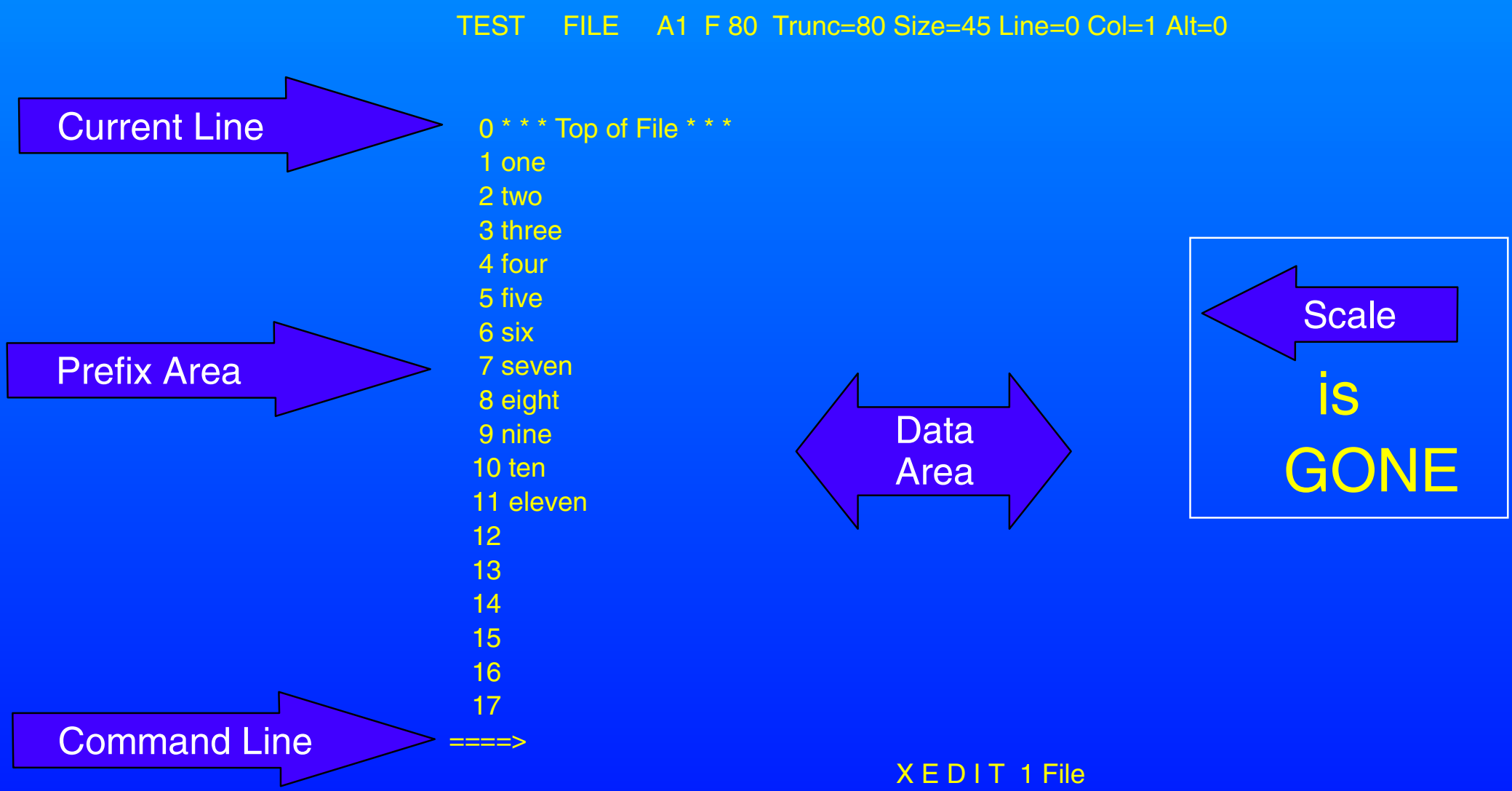
- **PROFILE XEDIT runs when XEDIT is invoked**
- **Sample: PROFILE XEDIT**

```
/* 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 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 * * *
```

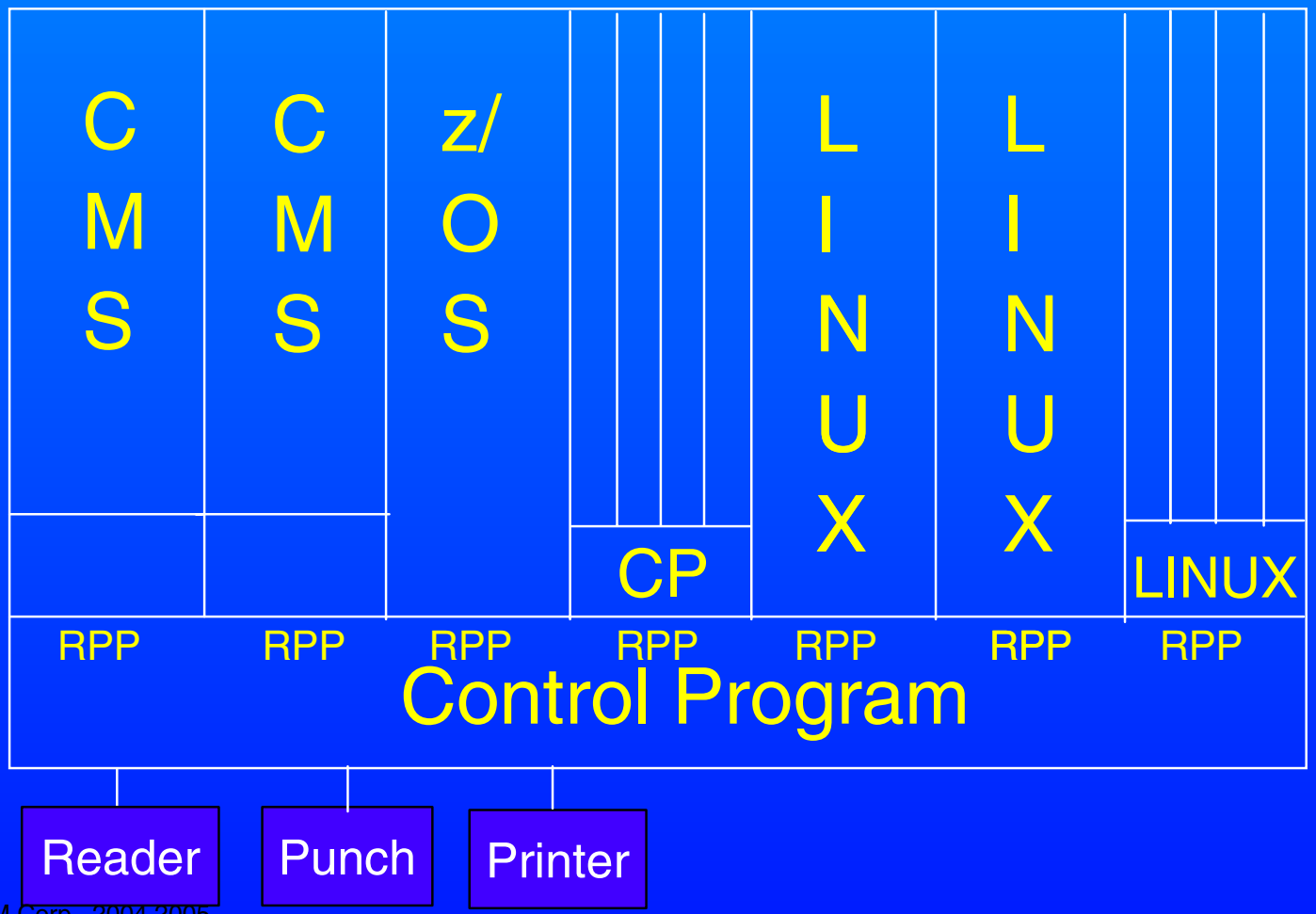
Pipelines

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

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

Spool Devices

- Reader, Printer, Punch



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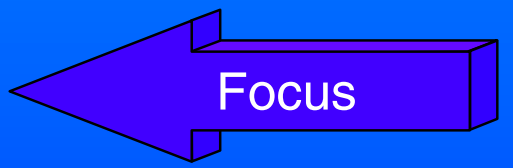

Debugging

- 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)

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

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

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RETURN TO INDEX