

The z/VM Evaluation Edition

Installation and Use Guide

The *z/VM® Evaluation Edition* is intended for use in Linux or other Proof-of-concept and other activities for evaluating the effectiveness, performance, robustness, and other capabilities of z/VM on an IBM® System z10™.

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The following sections constitute this guide:

- ▶ “Overview” on page 1
- ▶ “Requirements and planning” on page 3
- ▶ “Loading the z/VM Evaluation Edition” on page 7
- ▶ “Preparing for and installing Linux” on page 14
- ▶ “Saving changes to the DVD-RAM” on page 21
- ▶ “Restoring DVD-RAM with saved changes” on page 21

1.1 Overview

The z/VM Evaluation Edition is delivered on DVD-RAM. You may download the files and create your own DVD-RAM from:

https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?lang=en_US&source=zvmeval

Once you have a z/VM Evaluation Edition DVD-RAM disk, you place it in the DVD drive of a System z™ Hardware Management Console (HMC) and load it into memory in a logical partition. A DVD-RAM is read/write, so changes made to the system in memory can be written back to the disk.

No external disks are required to bring up the Evaluation Edition or to perform simple functions. However, in order to run any significant Linux® workload, external disks are required for z/VM paging and spooling, as well as for minidisks to hold Linux data.

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1.1.1 Highlighting conventions

The following highlighting and font conventions are used in this guide:

Monospace and bold	Commands entered on the command line
Bold	Values, buttons or fields that can be entered or clicked
Monospace	File, directory, user, and minidisk names
<i>Italics</i>	Names of windows or fields that can be seen

The following command conventions are used in this book:

- ▶ z/VM commands are prefixed with =>
z/VM commands are usually required to be in upper case, however they can be typed in lower case and the system will fold them to upper case before executing. For this reason, the commands are often described in upper case, but shown in examples in lower case.
- ▶ z/VM XEDIT subcommands are prefixed with =====>

1.2 Requirements and planning

Following are the minimum hardware and software requirements:

- ▶ The z/VM 5.3 Evaluation Edition DVD-RAM
- ▶ An IBM System z10 and access to an HMC
- ▶ An LPAR with at least 3 GB of memory, and with the *Global Performance Data Control* and the *Input/Output (I/O Configuration Control)* security settings enabled in the LPAR activation profile
- ▶ Three 3390-3 volumes (or larger) for paging, spooling and permanent minidisk space
- ▶ Three consecutive Open Systems Adapter (OSA) addresses
- ▶ An IP address for z/VM TCP/IP
- ▶ Additional IP addresses for Linux guests
- ▶ A 3270 emulator - see discussion in section 1.2.4, “3270 emulators” on page 5

1.2.1 Skills required and background reading

The z/VM Evaluation Edition was designed to be fairly easy to get started with. It would be helpful if the person installing it had familiarity with IBM System z, combined with a working knowledge of system programming, but these skills should not be essential. Also, basic 3270 skills, such as might be gained from z/OS® experience, will be helpful in getting around on z/VM.

If you intend to install Linux, basic Linux skills will also be helpful. However, this manual focuses mainly on the z/VM aspects of setting up the system.

For background reading, there is a IBM Redbook for those new to z/VM - *Introduction to the New Mainframe: z/VM Basics*, SG24-7316, on the Web at:

<http://www.redbooks.ibm.com/abstracts/sg247316.html?0open>

The entire z/VM library is on the Web at:

<http://www.vm.ibm.com/library/>

1.2.2 Resource values used in this guide

For reference, the resources used in the examples in this guide are as follows:

Table 1-1 Resources used in this guide

Resource	Value in this guide	Notes
CEC/LPAR names	H91/TICLTEST	Obtained from System z administrator
DASD real address/label for page space	371A/PG371A	3390-3 obtained from System z administrator
DASD real address/label for pool space	371B/SP371B	3390-3 obtained from System z administrator
DASD real address/label for Linux	5023/LX5023	3390-3 obtained from System z administrator
OSA Express starting address	6D0	First real address of three to be used for network connectivity
Default IEEE VLAN	1	VLAN trunk port number for OSA device
IEEE VLAN for z/VM and Linux	505	Obtained from Network administrator
z/VM TCP/IP address	9.12.20.40	Obtained from Network administrator
Subnet mask	255.255.255.0	Obtained from Network administrator
TCP/IP gateway IP address	9.12.20.1	Obtained from Network administrator
z/VM System ID	vm53eval	Often same as host name, but maximum length is eight characters
DNS server IP address	9.12.16.2	Obtained from Network administrator
z/VM host name	ip9-12-20-40	Obtained from Network administrator
z/VM domain name	pdl.pok.ibm.com	Obtained from Network administrator
Linux user ID	LINUX43	
Linux IP address	9.12.40.43	Obtained from Network administrator

1.2.3 Blank table for resources

A blank table is provided to write in the values that you will be using:

Table 1-2 Resources used for the z/VM Evaluation Edition

Resource	Value	Notes
CEC/LPAR name		
DASD real address/label for page space		
DASD real address/label for spool space		
DASD for Linux		
OSA Express starting address		
Default IEEE VLAN		
IEEE VLAN for z/VM and Linux		
z/VM TCP/IP address		
Subnet mask		
TCP/IP gateway IP address		
z/VM System ID		
DNS server IP address		
z/VM host name		
z/VM domain name		
Linux user ID		
Linux IP address		

1.2.4 3270 emulators

A 3270 emulator program is convenient for communicating with the z/VM Evaluation Edition after it is on the network. You can choose one of the following emulator programs:

- EXTRA! by Attachmate
- Cleo TN3270 by Cleo Communications
- IRMA by DCA
- Personal Communications by IBM
- TN3270 Plus by SDI
- Nexus Terminal by Nexus Integration
- UniKix J3270 by Clarity Solutions Inc.
- x3270 (open source, usually available on a Linux desktop)

It is recommended that you investigate the following settings for your emulator:

- ▶ Set the **Enter** and **Clear** function keys to be where you would expect them. On some emulators, the default Enter key is set to the right **Ctrl** key of modern keyboards. Likewise the **Clear** key is sometimes set to the **Esc** key in the upper left corner of modern keyboards or to the **Pause** key in the upper right.

- ▶ Set a larger screen size. Often the default number of lines in an emulator session is 24. You will probably be more productive with a 32-line display, a 43-line display or larger as long as it can fit in a window given your screen size and resolution.
- ▶ Have the session automatically reconnect after logoff. Having a new *logon screen* come back immediately after you log off can save you time. This is often not the default behavior.
- ▶ Save your connection sessions. Rather than continually typing in the IP address or host name of the z/VM Evaluation Edition to which you want to connect, spend a few minutes to define and save a session for the system to which you may want to connect. Then you can usually double-click the saved connection to quickly establish a new 3270 session.

1.2.5 Creating your own DVD-RAM

To create your own DVD-RAM disk, you must first have a DVD drive capable of writing to a DVD-RAM, a blank disk and software. You can get to the download site by starting at:

https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?lang=en_US&source=zvmeval

You will be asked to fill out a short questionnaire. Then you can download the following files:

ZVM.NUCLEUS	z/VM 5.3 nucleus
ZVM.RAMDISK	z/VM 5.3 self-contained system residence volume (RAM disk)
ZVM.ins	HMC install file
ZVMBOOT.IMAGE	Boot loader (part 1)
ZVMBOOT.PREFIX	Boot loader (part 2)
install_guide.pdf	Detailed installation information (this document)
readme.pdf	Readme text file
notices.file	Notices regarding Licensing Information

Download all the files. Place the blank disk in your DVD-RAM drive. Bring up your DVD-writer software and copy all the downloaded files to the DVD-RAM.

The following types of DVD-RAM media have been tested with the z/VM Evaluation Edition:

- ▶ Panasonic DVD-RAM 2-3x Speed Single-sided 4.7 GB/Non-cartridge
- ▶ Maxell DVD-RAM 4.7 GB V2 (REORDER #636070)

While other DVD-RAM media might function correctly, they have not been tested by IBM.

1.2.6 Other considerations

The following facts about the z/VM Evaluation Edition should be considered:

- ▶ The time required to IPL from DVD-RAM is from 6 to 15 minutes. If it fails, the only indication of the problem will be an entry in the HMC “Hardware Messages” log of a disabled wait of the logical partition and a change in color of the LPAR’s icon, probably to red.
- ▶ If the indicator on the DVD-RAM drive does not blink during the IPL process, make sure that the LPAR has been given access to the DVD as described in 1.3.1, “Accessing the DVD-RAM on the HMC” on page 9 and that the LPAR activation profile is defined as described in 1.2, “Requirements and planning” on page 3.
- ▶ The **SHUTDOWN REIPL** command is not supported.

1.3 Loading the z/VM Evaluation Edition

The z/VM Evaluation Edition runs entirely in memory using a RAMdisk; it is not installed on disk. If the LPAR that is running the z/VM Evaluation Edition is shut down for any reason, configuration and other RAMdisk changes will be lost. However, these changes can be saved on the DVD-RAM with the **RAMSAVE** command, as described in 1.6, “Saving changes to the DVD-RAM”.

Install the z/VM 5.3 Evaluation Edition from DVD-RAM:

1. Obtain an LPAR with associated resources as described in section 1.2, “Requirements and planning” on page 3.
2. Place the z/VM Evaluation Edition DVD-RAM into the HMC DVD drive.
3. Sit at the HMC or start an HMC session through a Web browser (if remote access is configured for your HMC).
4. Select your LPAR. In this example, it is on the **H91** CEC and the LPAR is named **TICLTST** as shown in the *CPC Images Work Area* on the left side of Figure 1-1.
5. Click the **counter-clockwise racetrack button** (left button with circular arrow in the lower right) until you see the *Recovery* menu.
6. Double-click the **Integrated 3270 Console** icon as shown on the right side of Figure 1-1. You should see a 3270 emulator window open.

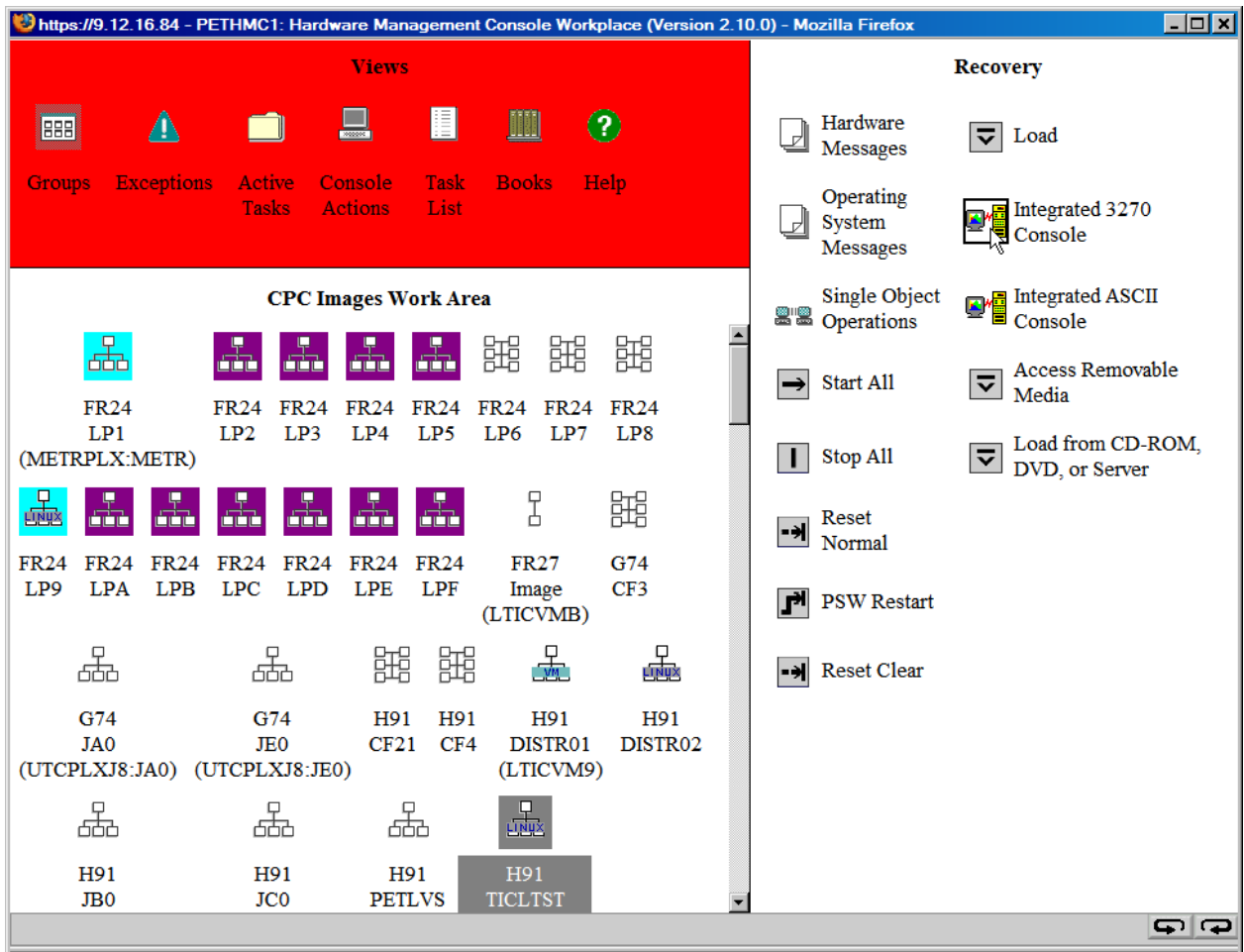


Figure 1-1 Starting the Integrated 3270 Console

- Click on the HMC window. With the LPAR still selected, double-click **Load from CD-ROM, DVD, or Server**, also in the *Recovery* menu. You should see a new window open as shown in Figure 1-2:

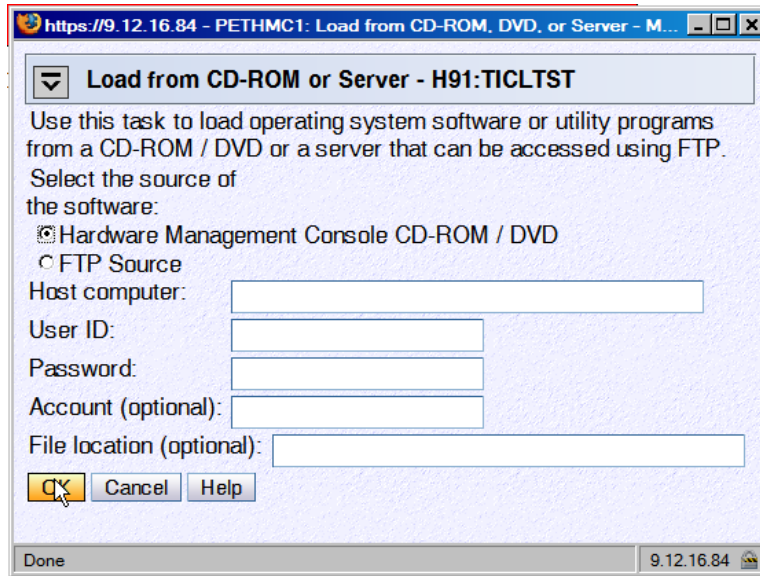


Figure 1-2 Load from DVD

- If not already selected, click on the radio button **Hardware Management Console CD-ROM / DVD**. Click **OK**.
- A new window opens as shown in Figure 1-3. The software **ZVM.ins** should be found. Click **OK**.

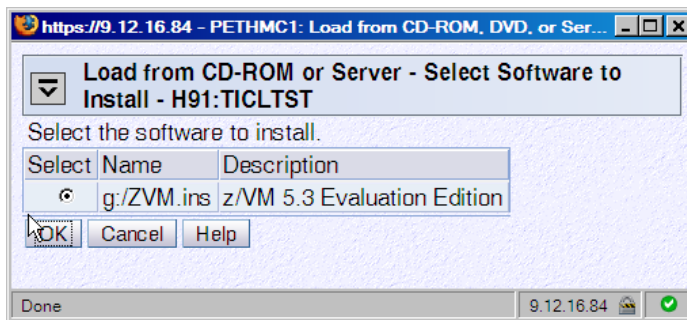


Figure 1-3 Loading software ZVM.ins

- You might see the warning screen stating *Load will cause jobs to be cancelled*. Click **Yes** to continue. The warning screen will close.
- The *Load from CDROM, DVD, or Server Progress* window opens as shown in Figure 1-4 on page 9. When the DVD is loaded, click **OK**. The load process should only take about 10-15 seconds.

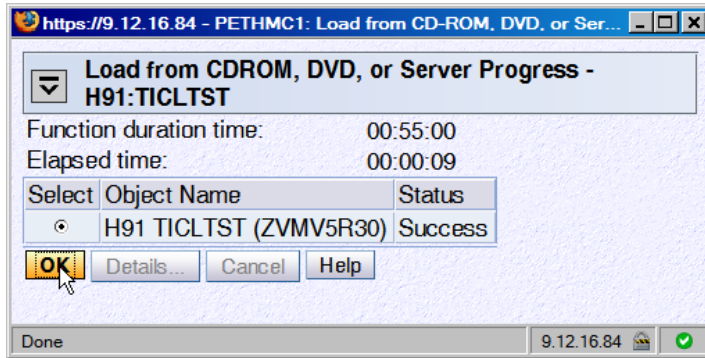


Figure 1-4 Load from DVD progress window

1.3.1 Accessing the DVD-RAM on the HMC

You now need to give the LPAR access to the DVD drive.

1. Return to the HMC *Recovery* menu and double-click **Access Removable Media**. The *Access to Removable Media* window shown in Figure 1-5 opens.

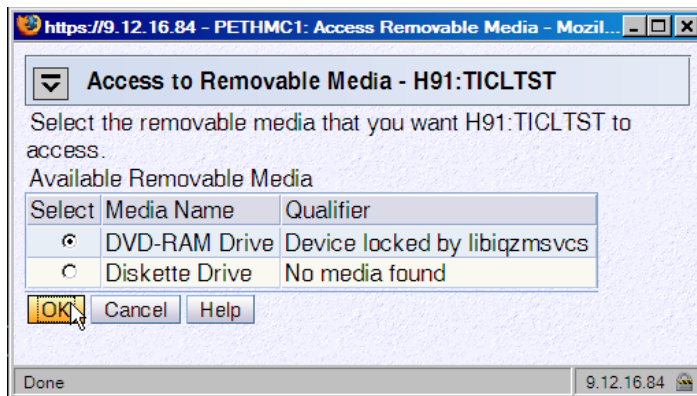


Figure 1-5 Selecting DVD-RAM drive

2. Click **OK** in the *Access to Removable Media* window. The confirmation window shown in Figure 1-6 opens:

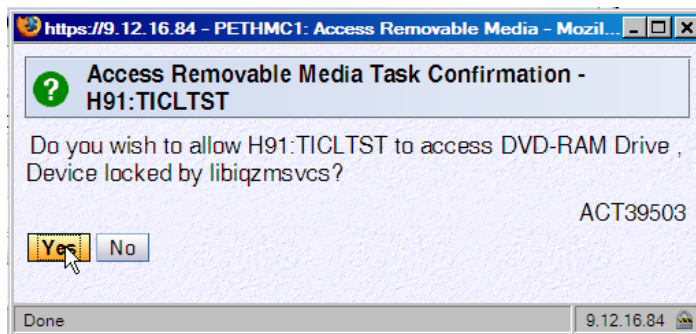


Figure 1-6 Confirming access to the DVD-RAM

3. Click **Yes** in the *Access Removable Media Task Confirmation* window. The RAMdisk will begin loading from the DVD-RAM. The window shown in Figure 1-7 on page 10 opens:

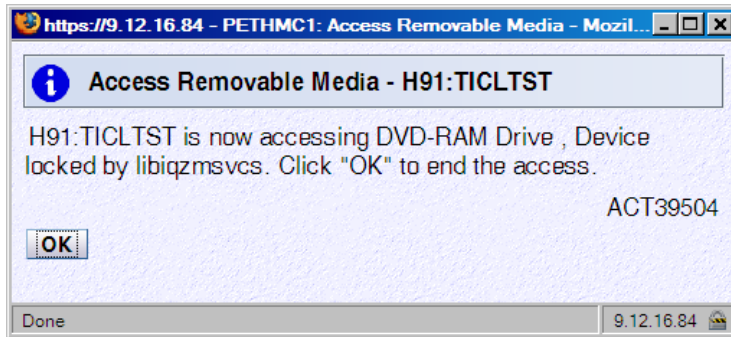


Figure 1-7 Allowing continued access to the DVD-RAM

4. Do not click OK in the *Access Removable Media* window, shown in Figure 1-7, until you are ready to end your access to the DVD drive. Leave this window open as long as you need access to the DVD drive and at least until the z/VM Evaluation Edition starts executing.
5. Switch to the *Integrated 3270 Console* window. After about 6-15 minutes, the z/VM 5.3 Evaluation Edition should start executing, as shown in Figure 1-8.

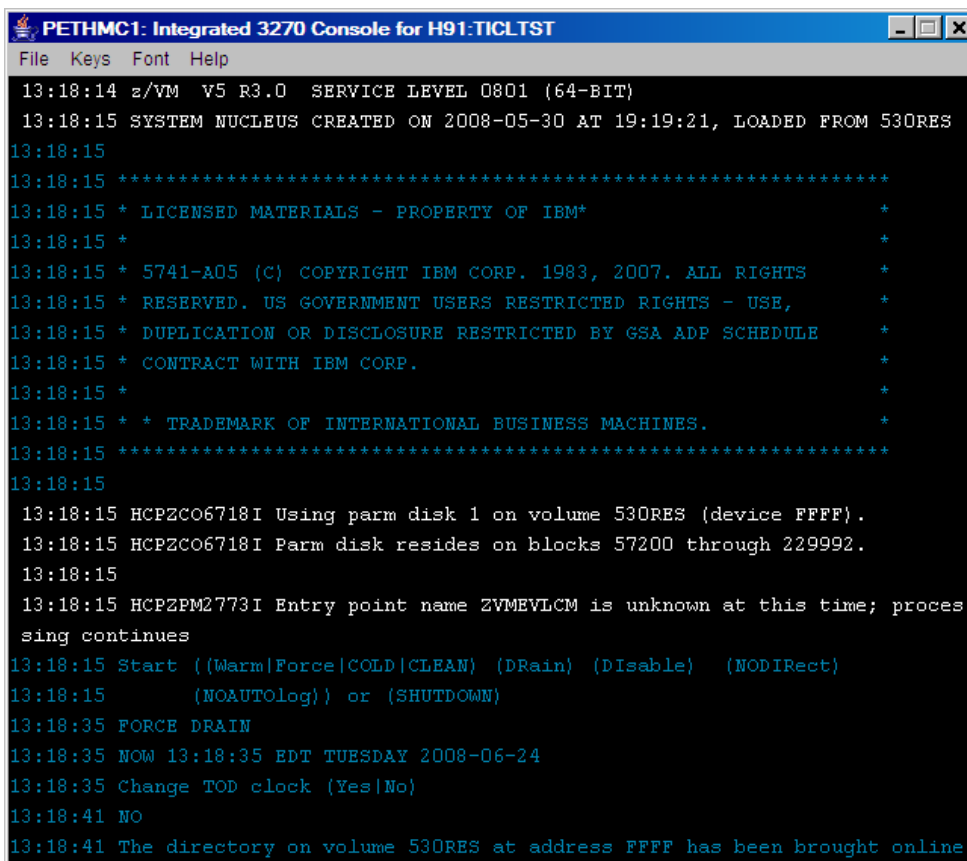


Figure 1-8 z/VM Evaluation Edition starting

6. Reply **force drain** at the *Start* prompt to continue the initial program load.
7. Reply **no** when you are asked if you want to *Change TOD clock*.

8. Text will scroll down the screen and you will see either a MORE . . . or HOLDING status in the bottom right corner. Press the **Esc** key to clear the screen immediately. You might have to do this more than once. At the VM READ prompt in the lower right corner, press **Enter**.
9. The last one should look similar to the screen shown in Figure 1-9. The error messages in the form of *Saved segment CMSxxxxx does not exist* are not a problem and can be ignored.

```

PETHMC1: Integrated 3270 Console for H91:TICLTST
File Keys Font Help
OM for userid OPERSYMP.
DVHPRO2008I ROLE = DIRMAINT
DVHPRO2008I ROLE = DIRMAINT
DVHPRO2008I ROLE = DATAMOVE
DVHPRO2008I ROLE = DATAMOVE
DVHNDY3880I New day processing started.
DVHNDY3881I New day processing completed.
DVHNDY3880I New day processing started.
DVHNDY3881I New day processing completed.
DVHDLY3882I Daily processing started.
DVHRLY3886I Hourly processing started; with 0 log
DVHRLY3886I files.
DVHDLY3885I Daily processing completed.
DVHDLY3882I Daily processing started.
DVHRLY3886I Hourly processing started; with 0 log
DVHRLY3886I files.
DVHDLY3885I Daily processing completed.
DVHBCK3871I Disk backup processing started.
DVHBCK3872I Disk backup part 1 completed.
DVHBCK3872I Disk backup part 2 started.
DVHBCK3873I Disk backup processing completed.
DVHRLY3886I Hourly processing started; with 0 log
DVHRLY3886I files.
z/VM V5.3.0    2008-05-22 15:06

DMSDCS1083E Saved segment CMSPIPES does not exist
DMSDCS1083E Saved segment CMSPIPES does not exist
DMSDCS1083E Saved segment CMSVMLIB does not exist
13:21:55 Command complete
13:21:55 Command complete
Ready; T=0.01/0.01 13:21:55

```

Figure 1-9 z/VM Evaluation Edition finishing IPLing

The z/VM Evaluation Edition is now initialized and you are logged on as the OPERATOR. You can now customize z/VM for your environment.

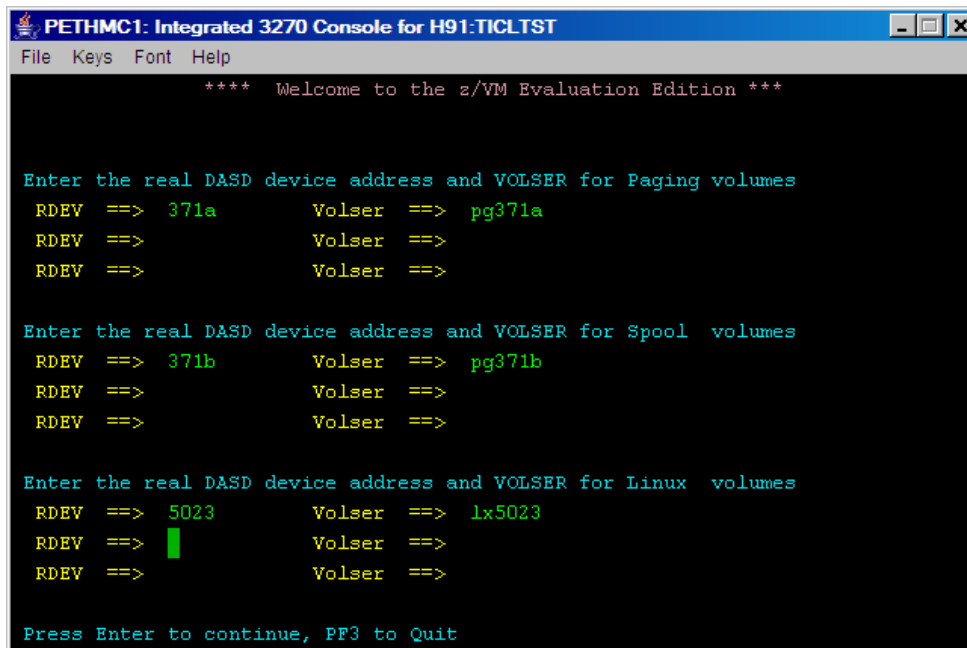
1.4 Customizing the z/VM Evaluation Edition

The **CUSTOMIZ** command is unique to the z/VM Evaluation Edition and is designed to make it easy to set z/VM up with disks for page, spool and Linux (minidisk) space, and to configure z/VM networking. To customize the z/VM Evaluation Edition, perform the following steps:

1. Invoke the **CUSTOMIZ** command. You should see a screen similar to Figure 1-10.

=> **customiz**

2. Enter the real device addresses and labels of the page, spool and Linux disks. If you listed values for your environment in Table 1-2 on page 5, use those values as shown in the following figure. Press **Enter** to continue:



```
PETHMC1: Integrated 3270 Console for H91:TICLTST
File  Keys  Font  Help
****  Welcome to the z/VM Evaluation Edition  ****

Enter the real DASD device address and VOLSER for Paging volumes
RDEV ==> 371a          Volser ==> pg371a
RDEV ==>              Volser ==>
RDEV ==>              Volser ==>

Enter the real DASD device address and VOLSER for Spool volumes
RDEV ==> 371b          Volser ==> pg371b
RDEV ==>              Volser ==>
RDEV ==>              Volser ==>

Enter the real DASD device address and VOLSER for Linux volumes
RDEV ==> 5023          Volser ==> lx5023
RDEV ==>              Volser ==>
RDEV ==>              Volser ==>

Press Enter to continue, PF3 to Quit
```

Figure 1-10 *CUSTOMIZ* - first panel

3. Enter the networking values into the second **CUSTOMIZ** panel. Press **Enter** when you are finished entering them:

```
PETHMC1: Integrated 3270 Console for H91:TICLTST
File Keys Font Help
**** Welcome to the z/VM Evaluation Edition ****

Enter the real OSA device address for the system vswitch
This must be an OSD type device
OSA RDEV ==> 6D0

If the above OSA device is cabled to a VLAN trunk port, enter the
default VLAN number, and the VLAN number for z/VM's TCPIP stack.
Otherwise, leave these blank.
DEFAULT VLAN ==> 1
z/VM VLAN ==> 505

Enter the IP address and netmask for this z/VM System
IP address ==> 9.12.20.40
IP netmask ==> 255.255.255.0

Enter the IP address of the gateway and DNS server
IP gateway ==> 9.12.20.1
IP DNS srv ==> 9.12.16.2

Enter the z/VM System ID
System ID ==> vm53eval

Enter the host and domain names for this z/VM system
If the hostname is the same as the System ID, you may leave the
Hostname field blank.
Hostname ==> ip9-12-20-40
Domain ==> pdl.pok.ibm.com

Press Enter to continue, PF3 to Quit
```

Figure 1-11 CUSTOMIZ - second panel

4. **CUSTOMIZ** will now begin formatting your page, spool and Linux disks. This can take several minutes per disk. Each time the screen fills up and shows either the MORE... or the HOLDING status message in the lower right corner, press the **Esc** key to clear the screen. After formatting the disks, **CUSTOMIZ** completes the networking configuration. Again, read the messages that are displayed.
5. **CUSTOMIZ** will terminate. The new z/VM system should be on the network. To test this, you can try a **ping** from another system or try opening a 3270 emulator session to the IP address or host name that you provided on the second screen of **CUSTOMIZ**.
6. Disconnect from the OPERATOR user ID on the Integrated 3270 Console:
=> **disc**
Disconnecting from a virtual machine is analogous to turning a PC's monitor off, while logging off is analogous to powering off the machine.

Note: If you cannot ping the new z/VM system, verify the following:

- ▶ That all the basic networking values are correct
- ▶ That the IEEE VLAN values are correct (if you entered them)
- ▶ That the TCPIP user ID is running with the **QUERY NAMES** command (look for TCPIP)

If all of these are correct, try shutting down the TCP/IP service virtual machine with the command **FORCE TCPIP**, then log on to TCPIP manually (the password is TCPIP), press **Enter** twice and watch the messages carefully for errors.

1.5 Preparing for and installing Linux

You should now be ready to define and install your first Linux system. Following are the high-level steps:

- ▶ “Defining a Linux user”
- ▶ “Preparing to install Linux” on page 19
- ▶ “Installing Linux” on page 20 - specific details are not provided

1.5.1 Defining a Linux user

The directory maintenance feature DirMaint™ is running by default when the z/VM Evaluation Edition is loaded. DirMaint is used to manage the z/VM user directory.

Note: this is a priced feature of the licensed z/VM, but there is no charge for DirMaint in the Evaluation Edition.

Perform the following steps to define a user ID for Linux:

1. Start a 3270 emulator session to your z/VM Evaluation Edition system (or use the Integrated 3270 Console). You should see a logon screen.
2. Log on to MAINT. The default passwords shipped with z/VM are the same as the user ID, so the password is also MAINT (passwords are not case sensitive). The **DIRMAINT PW** command can be used to change the passwords.
3. You should see messages similar to the following:

```
LOGON MAINT
HCPLNM102E DASD 0123 forced R/O; R/W by DIRMAINT
z/VM Version 5 Release 3.0, Service Level 0881 (64-bit),
built on IBM Virtualization Technology
There is no logmsg data
FILES:  NO RDR,  NO PRT,  NO PUN
LOGON AT 14:18:40 EDT TUESDAY 06/24/08
DMSWSP327I The installation saved segment could not be loaded
z/VM V5.3.0   2008-05-22 15:06
```

4. Press **Enter** at the VM READ prompt in the lower right corner. This runs the **PROFILE EXEC**. Ignore messages with codes DMSDCS1083E or DMSACP113S.

```
DMSDCS1083E Saved segment CMSPIPES does not exist
DMSDCS1083E Saved segment CMSPIPES does not exist
DMSDCS1083E Saved segment CMSVMLIB does not exist
DMSACP113S B(5E5) not attached or invalid device address
DMSACP113S D(51D) not attached or invalid device address
```

- Invoke the **DIRMAINT NEEDPASS NO** command so that a password is not required for every DirMaint command.

Note: All DirMaint subcommands are prefaced with the **DIRMAINT** command which can be shortened to **DIRM**.

```
=> dirm needpass no
DVHXMT1181R Enter the current logon password of MAINT at ZVMV5R30 for
DVHXMT1181R authentication. It will not be displayed on the
DVHXMT1181R terminal. To exit without processing the command, just
DVHXMT1181R press ENTER.
MAINT (you will not see the password displayed)
DVHXMT1191I Your NEEDPASS request has been sent for processing.
Ready; T=0.02/0.02 08:10:14
DVHREQ2288I Your USEROPTN request for MAINT at * has been accepted.
DVHBIU3450I The source for directory entry MAINT has been updated.
DVHBIU3456I Object directory update is not required for this source
DVHBIU3456I update.
DVHREQ2289I Your USEROPTN request for MAINT at * has completed; with
DVHREQ2289I RC = 0.
```

This shows that DirMaint is running and allows MAINT to issue DirMaint commands without needing to enter the MAINT password.

Defining a profile for Linux user IDs

- DirMaint has the concept of a prototype directory, which is used as a template for defining virtual machines. You can construct a prototype from a default profile. Get a copy of a profile, **IBMDFLT**, with the **DIRMAINT GET** command. The **FOR IBMDFLT** parameter specifies to get the data on behalf of that profile or user. The **NOLOCK** option specifies that the profile or user is not to be locked by the **GET** subcommand. Issue the following command and check for a return code of 0:

```
=> dirm for ibmdflt get nolock
DVHXMT1191I Your GET request has been sent for processing.
Ready; T=0.01/0.01 08:12:14
DVHREQ2288I Your GET request for IBMDFLT at * has been accepted.
DVHGET3305I Entry IBMDFLT sent, no lock attempt was made.
RDR FILE 0008 SENT FROM DIRMAINT PUN WAS 0006 RECS 0019 CPY 001 A NOHOLD NOKEEP
DVHREQ2289I Your GET request for IBMDFLT at * has completed; with RC =
DVHREQ2289I 0.
```

- A file is sent the reader (RDR) by DirMaint. List MAINT's reader files with the **RL** command. You should see the **IBMDFLT DIRECT** reader file:

```
=> r1
MAINT  RDRLIST A0 V 164 Trunc=164 Size=1 Line=1 Col=1 Alt=0
Cmd  Filename Filetype Class User  at Node  Hold  Records  Date      Time
      IBMDFLT DIRECT  PUN A DIRMAINT ZVMV5R30 NONE      19 6/17    8:12:15
```

- Move the file from MAINT's reader to it's A disk with the **RECEIVE** command. Use the **Tab** key to move the cursor to the left of the **IBMDFLT DIRECT** file and type, on that line, the command:

```
receive / lnxdf1t protodir a
```

The parameter **/** specifies *this* reader file. The next three parameters rename the file **LNXDFLT PROTODIR A**. Press **Enter**:

```
MAINT  RDRLIST A0 V 164 Trunc=164 Size=1 Line=1 Col=1 Alt=0
Cmd  Filename Filetype Class User  at Node  Hold  Records  Date      Time
      receive / lnxdf1t protodir aA DIRMAINT ZVMV5R30 NONE      19 6/17    8:12:15
```

- Press **F3** to exit the reader list.

5. Edit the new file with the **XEDIT** command.

```
=> x lnxdf1t protodir a
```

If you are new to **XEDIT** you may wish to read the *XEDIT User's Guide*:

<http://publibz.boulder.ibm.com/epubs/pdf/hcsd9b10.pdf>

In addition there is an "XEDIT quick reference" on page 22 for your convenience.

6. The lines on the screen might wrap and be difficult to read. It is safe to work with only the first 72 columns of data. Use the **VERIFY** subcommand to view only columns 1 through 72:

```
====> v 1 72
```

7. Type the following prefix commands into the "Prefix area" on the left side, as shown below:

- Add three blank lines after the first line with the **a3** prefix command.
- Add two blank lines after the LINK MAINT 019E 019E RR line.
- Delete the three lines that LINK to the MAINT 040x disks, and the four comment lines below them with the block delete (**dd**) prefix command:

```
LNXDFTL PROTODIR A0 F 80 Trunc=72 Size=15 Line=0 Col=1 Alt=0
00000 * * * Top of File * * *
a3 PROFILE IBMDFLT
00002 SPOOL 000C 2540 READER *
00003 SPOOL 000D 2540 PUNCH A
00004 SPOOL 000E 1403 A
00005 CONSOLE 009 3215 T
00006 LINK MAINT 0190 0190 RR
00007 LINK MAINT 019D 019D RR
a2 LINK MAINT 019E 019E RR
dd LINK MAINT 0402 0402 RR
00010 LINK MAINT 0401 0401 RR
00011 LINK MAINT 0405 0405 RR
00012 *****
00013 *****
00014 *
dd *DVHOPT LNK0 LOG1 RCM1 SMS0 NPW1 LNGAMENG PWC20080528 CRCB"
```

Press **Enter**. The prefix commands will be processed and the appropriate lines will be added and deleted.

8. Change the prototype directory as follows:

- Change the first line to USER LNXDFLT LNXDFLT 512M 1G G. This will:
 - Replace the user ID and password (LNXDFTL)
 - Set the default machine size to 512 MB
 - Set the maximum machine size to 1 GB
 - Give the user ID class G privilege
- On the first blank line, add the statement **IPL CMS**. This loads CMS when the user ID is started.
- On the second blank line, add **MACHINE ESA 4**. This sets the virtual machine type to ESA and allows a maximum of four virtual CPUs to be defined.
- On the third blank line, the **NICDEF** statement creates a virtual network interface card of **TYPE QDIO** starting at virtual address **600** on the **VSWITCH** named **VSW1**.
- Add two **AMDISK** statements into the blank lines at the bottom. Use a keyword of **AUTOG**, sizes of **3300** and **38**, another keyword of **DEFAULT**, and an access mode of **MR**. These lines will create a minidisk of **3300** cylinders (about 2.2 GB) at virtual address **100** and another minidisk of size **38** cylinders (about 28MB) at virtual address **191**. The **AUTOG** keyword tells DirMaint to obtain the disk space automatically from the group named

DEFAULT. The disks specified in the *Linux volumes* section of **CUSTOMIZ** were added to this DirMaint disk group.

```
USER LNXDFLT LNXDFLT 512M 1G G
IPL CMS
MACHINE ESA 4
NICDEF 600 TYPE QDIO LAN SYSTEM VSW1
SPOOL 000C 2540 READER *
SPOOL 000D 2540 PUNCH A
SPOOL 000E 1403 A
CONSOLE 009 3215 T
LINK MAINT 0190 0190 RR
LINK MAINT 019D 019D RR
LINK MAINT 019E 019E RR
AMDISK 100 3390 AUTOG 3300 DEFAULT MR
AMDISK 191 3390 AUTOG 38 DEFAULT MR
```

9. Press **Enter** to move the cursor to the XEDIT subcommand line. Save the file and leave XEDIT with the **FILE** subcommand:

```
====> file
```

You have now created a prototype directory entry named LNXDFLT.

10. Add it to the user directory with the **DIRMAINT FILE** command:

```
=> dirm file lnxdflt protodir a
PUN FILE 0040 SENT TO DIRMAINT RDR AS 0032 RECS 0019 CPY 001 0 NOHOLD NOKEEP
DVHXTM1191I Your FILE request has been sent for processing.
Ready; T=0.01/0.01 16:11:42
DVHREQ2288I Your FILE request for MAINT at * has been accepted.
DVHRCV3821I File LNXDFLT PROTODIR A has been received; RC = 0.
DVHREQ2289I Your FILE request for MAINT at * has completed; with RC = 0.
```

11. Check for a return code of 0. If **DIRM FILE** gets a different return code and is not successful, look for messages that end with a suffix of "E" (for Error) and try to fix the problem. In general a DirMaint return code of 0 is good, a return code of 4 is a warning, and a return code of 8 or greater is an error.

Defining a Linux user ID

Now that you have a prototype, it is time to create your first Linux user. Think of this as creating a virtual server with memory, disk and network resources. In this example a user is defined with 512 MB of memory, the disk space of a single 3390-3 (about 2.3 MB) with most allocated to Linux but some to a local CMS disk, and a single virtual NIC.

The first user is named LINUX43 in this example because of a convention that uses the last octet of the IP address (this Linux system will get the IP address 9.12.20.43). Using part of the IP address in the user ID can sometimes be helpful in associating systems with TCP/IP addresses. But of course, you can name the user whatever you would like.

Perform the following steps:

1. Add the new user to the directory with the **DIRMAINT ADD** command:

```
=> dirm add linux43 like lnxdflt pw lnx4vm
DVHREQ2288I Your ADD request for LINUX43 at * has been accepted.
DVHBIU3450I The source for directory entry LINUX43 has been updated.
DVHBIU3425I The next ONLINE will take place as scheduled.
DVHBIU3450I The source for directory entry LINUX43 has been updated.
DVHBIU3425I The next ONLINE will take place as scheduled.
DVHBIU3450I The source for directory entry LINUX43 has been updated.
DVHBIU3425I The next ONLINE will take place as scheduled.
DVHBIU3450I The source for directory entry LINUX43 has been updated.
```

```

DVHBIU3425I The next ONLINE will take place as scheduled.
DVHSCU3541I Work unit 01103239 has been built and queued for processing.
DVHSHN3541I Processing work unit 01103239 as MAINT from VM53EVAL,
DVHSHN3541I notifying MAINT at VM53EVAL, request 43.4 for LINUX43
DVHSHN3541I sysaffin *; to: AMDISK 0100 3390 AUTOG 3300 DEFAULT MR
DVHBIU3450I The source for directory entry LINUX43 has been updated.
DVHSHN3430I AMDISK operation for LINUX43 address 0100 has finished (WUCF
DVHSHN3430I 01103239).
DVHSCU3541I Work unit 01103239 has been built and queued for processing.
DVHSHN3541I Processing work unit 01103239 as MAINT from VM53EVAL,
DVHSHN3541I notifying MAINT at VM53EVAL, request 43.5 for LINUX43
DVHSHN3541I sysaffin *; to: AMDISK 0191 3390 AUTOG 38 DEFAULT MR
DVHBIU3450I The source for directory entry LINUX43 has been updated.
DVHSHN3430I AMDISK operation for LINUX43 address 0191 has finished (WUCF
DVHSHN3430I 01103239).
DVHDRC3428I Changes made to directory entry LINUX43 have just been
DVHDRC3428I placed online.
DVHREQ2289I Your ADD request for LINUX43 at * has completed; with RC =
DVHREQ2289I 0.

```

Check for a return code of 0. If **DIRM ADD** is not successful, look for messages that end with a suffix of "E" (for Error) and try to fix the problem.

2. Add a command that will be executed when LINUX43 is logged on to grant access to the VSWITCH named VSW1. The command must be typed in all capital letters (this is one of the few places where z/VM does not fold lower case to upper). If your enterprise does not use IEEE VLANs, you should omit **VLAN 505**:

```

=> dirm for linux43 command add 1 SET VSWITCH VSW1 GRANT LINUX43 VLAN 505
DVHXMT1191I Your COMMAND request has been sent for processing.
Ready; T=0.01/0.01 14:06:37
DVHREQ2288I Your COMMAND request for LINUX43 at * has been accepted.
DVHBIU3450I The source for directory entry LINUX43 has been updated.
DVHBIU3424I The next ONLINE will take place immediately.
DVHBIU3428I Changes made to directory entry LINUX43 have been placed
DVHBIU3428I online.
DVHREQ2289I Your COMMAND request for LINUX43 at * has completed; with RC
DVHREQ2289I = 0.

```

3. Add a second command that will be executed after the first. This command will **COUPLE** the NIC at virtual address **600** to the **SYSTEM VSWITCH** named **VSW1**.

```

=> dirm for linux43 command add 2 COUPLE 600 TO SYSTEM VSW1
DVHXMT1191I Your COMMAND request has been sent for processing.
Ready; T=0.01/0.01 14:06:55
DVHREQ2288I Your COMMAND request for LINUX43 at * has been accepted.
DVHBIU3450I The source for directory entry LINUX43 has been updated.
DVHBIU3424I The next ONLINE will take place immediately.
DVHBIU3428I Changes made to directory entry LINUX43 have been placed
DVHBIU3428I online.
DVHREQ2289I Your COMMAND request for LINUX43 at * has completed; with RC
DVHREQ2289I = 0.

```

4. Verify the new directory entry with the **DIRMAINT REVIEW** command:

```

=> dirm for linux43 rev
Ready; T=0.01/0.01 14:08:06
DVHREQ2288I Your REVIEW request for LINUX43 at * has been accepted.
RDR FILE 0070 SENT FROM DIRMAINT PUN WAS 0056 RECS 0022 CPY 001 A NOHOLD NOKEEP
DVHREQ2289I Your REVIEW request for LINUX43 at * has completed; with
DVHREQ2289I RC = 0.

```

- The directory entry will be sent to MAINT's reader which can be viewed with the PEEK command (note that in this example the reader file is number 70). Set the viewable columns to 72 with the XEDIT SET VERIFY subcommand (which can be shortened to V):

```
=> peek 70
====> v 1 72
USER LINUX43 XXXXXXXX 512M 1G G
  COMMAND SET VSWITCH VSW1 GRANT LINUX43 VLAN 505
  COMMAND COUPLE 600 TO SYSTEM VSW1
  IPL CMS
  MACHINE ESA 4
  CONSOLE 0009 3215 T
  NICDEF 0600 TYPE QDIO LAN SYSTEM VSW1
  SPOOL 000C 2540 READER *
  SPOOL 000D 2540 PUNCH A
  SPOOL 000E 1403 A
  LINK MAINT 0190 0190 RR
  LINK MAINT 019D 019D RR
  LINK MAINT 019E 019E RR
  MDISK 0100 3390 1 3300 LX5023 MR
  MDISK 0191 3390 3301 38 LX5023 MR
*DVHOPT LNKO LOG1 RCM1 SMSO NPW1 LNGAMENG PWC20080703 CRCÆÛ
DVHREV3356I The following are your user option settings:
DVHREV3356I Links DISABLED Logging ON RcvMsg ON Smsg OFF NeedPW ON
DVHREV3356I Lang AMENG
```

1.5.2 Preparing to install Linux

Before installing Linux, you must log on to the new user that you created (LINUX43 in this example) with the following steps:

- Log off of MAINT:

```
=> log
```

- Get a new logon screen and log on to the new Linux user, **LINUX43** in this example. The password (**LNx4VM** in this example) will not be displayed on the screen:

```
Fill in your USERID and PASSWORD and press ENTER
(Your password will not appear when you type it)
USERID  ==> linux43
PASSWORD ==>
```

```
COMMAND ==>
```

- Observe the messages as the virtual machine IPLs CMS. Verify that a NIC has been created at virtual address 0600:

```
LOGON LINUX43
NIC 0600 is created; devices 0600-0602 defined
HCPNDF6011E You are not authorized to COUPLE to SYSTEM VSW1
z/VM Version 5 Release 3.0, Service Level 0881 (64-bit),
built on IBM Virtualization Technology
There is no logmsg data
FILES: 0006 RDR, NO PRT, NO PUN
LOGON AT 14:22:47 EDT THURSDAY 07/03/08
Command complete
NIC 0600 is connected to VSWITCH SYSTEM VSW1
DMSWSP327I The installation saved segment could not be loaded
z/VM V5.3.0 2008-05-22 15:06
```

Ignore the HCPNDF6011E message. The NIC is coupled to VSW1 by the second command that you added to the directory entry.

4. You should see a VM READ prompt in the lower right corner of the screen. Press **Enter** to complete the IPL of CMS:

```
DMSDCS1083E Saved segment CMSPIPES does not exist
DMSDCS1083E Saved segment CMSPIPES does not exist
DMSDCS1083E Saved segment CMSVMLIB does not exist
DMSACP112S A(191) device error
```

The message “DMSACP112S A(191) device error” is expected. You defined a minidisk at virtual address 191 which CMS tries to access as file mode A. However, it has not been formatted for the CMS file system.

5. Format the LINUX43 191 disk with the **FORMAT** command. In this example the minidisk is given a label of `lnx191`:

```
=> format 191 a
DMSFOR603R FORMAT will erase all files on disk A(191). Do you wish to continue?
Enter 1 (YES) or 0 (NO).
1
DMSFOR605R Enter disk label:
lnx191
DMSFOR733I Formatting disk A
DMSFOR732I 38 cylinders formatted on A(191)
```

You can now install Linux onto the LINUX43 user ID.

1.5.3 Installing Linux

The details of installing Linux are outside the scope of this manual. The overall steps are as follows:

1. Obtain the Linux install media from your distributor.
2. Make the Linux install images available on the network.
3. Transfer the Linux RAMdisk and kernel to the Linux user's 191 disk.
4. Create parameter files as necessary.
5. Create an installation EXEC to punch the files and IPL from the reader.
6. Begin the installation process from a 3270 session.
7. Complete the installation process from a graphical session (usually VNC).

There are a number of sources of documentation that you can use to install Linux:

- ▶ An installation manual from your Linux distributor
- ▶ *z/VM and Linux on IBM System z: The Virtualization Cookbook for SLES10* or *z/VM and Linux on IBM System z: The Virtualization Cookbook for RHEL5*, on the Web at:
<http://linuxvm.org/present/>
- ▶ *z/VM V5R3.0 Getting Started with Linux on System z9® and zSeries®*, SC24-6096-02, on the Web at:
<http://publibz.boulder.ibm.com/epubs/pdf/hcsx0b20.pdf>

1.6 Saving changes to the DVD-RAM

You probably want to save any z/VM configuration or other changes made on the DVD-RAM. You will not be able to easily revert to the original version of the Evaluation Edition, so be sure this is the system you want to save. On the other hand, if you do not save the system and the LPAR is reset, your changes will be lost.

If the *Access Removable Media* window is no longer up, return to the HMC session and bring up the window as described in section 1.3.1, “Accessing the DVD-RAM on the HMC” on page 9.

Issue the RAMSAVE command to write the state of the current system back to the DVD-RAM disk:

```
=> ramsave
5351 changed RAMdisk pages saved
```

Note: If the *Access Removable Media* task is not active for the z/VM Evaluation Edition LPAR, you will get an error:

```
=> ramsave
ZVM0002E Error saving RAMdisk data
Ready(00002); T=0.01/0.01 13:56:30
```

You have now saved the system’s state to the DVD-RAM disk.

1.7 Restoring DVD-RAM with saved changes

You might want to test that the changes written to the DVD-RAM are applied when you relPL. To do so, perform the following steps:

1. Shut down all Linux systems.
2. Shut down the z/VM Evaluation Edition:
=> **shutdown**
3. Repeat the steps in section 1.3, “Loading the z/VM Evaluation Edition” on page 7.

At this point, you can continue to use the z/VM Evaluation Edition to accomplish your evaluation objectives.

References

A.1 Possible wait states

If the partition icon turns the color used for Disabled Wait (red), the “Hardware Messages” screen will show the event and “Details” will show the Processor Status Word (PSW) value. The wait state is the last four hexadecimal numbers in the PSW.

The value 9082 usually means that there is not enough memory configured in the LPAR. Any other values probably means that the DVD-RAM disk is not being IPLed on an IBM System z10.

A.2 XEDIT quick reference

XEDIT has *line commands* which are typed on the command line (==>) and *prefix commands* which are typed over the line numbers on the left side of the screen.

Line Commands

a	Add a line
a<n>	Add ‘n’ lines
c/<old>/<new>/ <n> <m>	Search for string ‘old’ and replace it with ‘new’ for ‘n’ lines below the current line and ‘m’ times on each line. ‘*’ can be used for ‘n’ and ‘m’
/<string>	Search for ‘string’ from the current line
-/<string>	Search backwards for ‘string’
all /<string>/	Show all occurrences of ‘string’ and hide other lines
bottom	Move to the bottom of the file
top	Move to the top of the file
down <n>	Move down ‘n’ lines
up <n>	Move up ‘n’ lines
file	Save the current file and exit XEDIT
ffile	Save the current file and exit but don’t warn of overwrite
save	Save the current file but don’t exit
quit	Exit XEDIT if no changes have been made
qquit	Exit XEDIT even if changes have not been saved
left <n>	Shift ‘n’ characters to the left
right <n>	Shift ‘n’ characters to the right
get <file>	Copy file and insert past the current line
:<n>	Move to line ‘n’
?	Display last command
=	Execute last command
x <file>	Edit ‘file’ and put it into the XEDIT “ring”
x	Move to the next file in the ring

Prefix Commands

a	Add one line
a<n>	Add 'n' lines
c	Copies one line
cc	Copies a block of lines
d	Deletes one line
dd	Deletes a block of lines
f	Line after which a copy (c) or a move (m) is to be inserted
p	Line before which a copy (c) or a move (m) is to be inserted
i	Insert a line
i<n>	Insert 'n' lines
m	Move one line
mm	Move a block of lines
"	Replicate a line
"<n>	Replicate a line 'n' times
""	Replicate a block of lines

A.3 Support

No formal support is provided for the z/VM Evaluation Edition. However, questions and problems may be submitted by e-mail to:

zvmdemo@us.ibm.com

