

# **OpenSolaris for System Z Installation Guide - Build 100**

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This document provides detailed installation instructions for the OpenSolaris for System z build 100 release.

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# Planning for OpenSolaris for System Z

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# Planning for OpenSolaris for System Z Installation

This book is your primary installation document. From here, you will be directed to other documentation when necessary.

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## Pre-Installation Checklist

Do not begin the installation process until you complete ALL of the pre-installation requirements in this checklist:

1. Read this entire document. The document describes the overall installation process and the steps you will be performing during the installation.
2. Read the release notes that accompany this document. The release notes describe any last-minute changes or modifications to the installation process, and explains the overall contents of the installation tape and packages.
3. Ensure that you have successfully installed z/VM on your processor. The OpenSolaris for System Z distribution requires the presence of z/VM to operate correctly. Consult the IBM documentation for assistance in installing and configuration of z/VM.
4. Ensure that you have retrieved and applied PTF UM32414 for APAR VM64531 on z/VM 5.3 to your z/VM system. This PTF is required for OpenSolaris network devices to operate correctly. The equivalent Special Programming Enhancement (SPE) for z/VM 5.4 is VM64471.

If you previously installed the earlier APAR fix for VM64464 for z/VM 5.3, you do not need to install VM64531, as the code is identical. The updated APAR contains a set of modified license terms to permit OpenSolaris to legally run on IFL processors.

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## Requirements for Installation of OpenSolaris for System z

The installation process needs the following things to be successful:

- A userid with at least CP class G and E privileges.

This userid will be used to copy the disk images to your local disk subsystem and to create a NSS used as part of the OpenSolaris boot process. Class E privileges are necessary to be able to manipulate shared segments and NSSes.

### OpenSolaris Guest Userids Do Not Need Elevated Privileges

The CP privileges required by the userid installing the first system are not necessary for normal guest operations. Class E privileges are needed only if the guest is to be able to resave the initial ramdisk, which is not part of normal system operations.

- Link access to the disks attached or defined to the userid on which the OpenSolaris distribution is to be installed.
- If using the tape installation method, access to a tape drive is needed.
- If installing using the DVD images, access to the FTP command (usually stored on TCPMAINT 592) and link passwords for the guest userid minidisks.

As mentioned above, OpenSolaris creates a fairly large NSS in spool to contain the initial ramdisk image. You may need to extend the size of your z/VM system spooling space to contain this NSS. Refer to the z/VM documentation for instructions on extending spool space.

---

## How to Organize Your Materials

To install OpenSolaris for System Z, you should confirm that you have all the materials you will need before beginning the installation process. Before beginning, you should have:

- Media

The OpenSolaris for System z CD or tape image

### Images are Delivered on DVD

The files and images that make up the prototype are delivered on DVD. The DVD contains both the individual files and a AWSTAPE format tape image file suitable for creating a physical tape. See the release notes for instructions on creating a physical 3490E or 359x installation tape.

- Documentation

The installation document (this one).

The release notes for the version you intend to install.

---

## Installation Overview

OpenSolaris for System Z installation consists of the following basic processes:

- Deciding whether to use DVD or physical tape for installation.
- Creating an installation tape (optional for DVD installs).
- Preparing a virtual machine for the installation.
- Formatting and preparing minidisks for the installation.
- Loading the installation images from the install media and restoring the images onto the prepared minidisks.
- Performing some basic post-installation configuration tasks.

These processes require you to issue commands, enter data, and respond to system prompts to complete the configuration of your OpenSolaris system.

## Installation Types

The OpenSolaris for System Z distribution is a snapshot of a running system. Initial installation is performed by copying the snapshot to minidisks attached to a virtual machine. Migration to future upgrade versions are performed by installing a new virtual machine as a complete replacement.

# The Prototype System Distribution Media

## Prototype System Distribution Tape

As shown in Appendix A, “Installation Tape Contents” on page 26, the prototype system distribution tape contains four tape files:

- File 1 contains:
  - The VMARC utility (used to compress the disk images to reduce space requirements on disk and tape),
  - The DDR2CMSX utility (a modified version of the CMS DDR utility capable of restoring disk images from a CMS disk file to minidisks),
  - Softcopy files for all OpenSolaris for System Z documentation in multiple formats:
    - Text format (suitable for reading with CMS utilities such as XEDIT or BROWSE)
    - Adobe Portable Document Format (PDF) format files, readable on workstations
    - IBM Bookmanager-compatible files (BOOK) compatible with IBM Library Reader
  - A sample CP directory entry for a OpenSolaris for System Z virtual machine (SOLDIST DIRECT).
- File 2 contains a compressed disk image for the 191 minidisk defined for the sample SOLDIST virtual machine. This minidisk contains CMS-based startup processing for the virtual machine and other maintenance tools for the release.
- File 3 contains a compressed disk image for the 200 minidisk defined for the sample SOLDIST virtual machine. This minidisk contains the OpenSolaris code and filesystems.
- File 4 contains the ramdisk and tools to recreate the OpenSolaris ramdisk image used for recovery and for initial IPL.

## Prototype System Distribution DVD

The DVD distribution provides the same files and images described above for the distribution tape in directories named FILE1, FILE2, FILE3, and FILE4. An additional directory named TAPEIMG contains the AWSTAPE tape image file equivalent to the tape distribution described above and DETAPEM.EXEC and DETAPE.EXEC. DETAPEM.EXEC is a self-extracting version of the tools needed to create the distribution tape on your local tape drive. DETAPE.EXEC is an ASCII version of the DETAPE tool to allow you to browse it on your workstation before running it on your z/VM system.

## Tools and Utilities for Installation

OpenSolaris for System Z uses several CMS-based tools to simplify and streamline several of the installation tasks required to set up a working OpenSolaris virtual machine on z/VM. These tools include:

**VMARC MODULE** This tool allows compressing and uncompressing archives of CMS files, preserving CMS file and record attributes and metadata. The OpenSolaris installation process uses VMARC to uncompress stored disk images distributed in compressed form to save tape and disk space.

**DDR2CMSX MODULE** This tool reads a stored disk image and writes it to a minidisk. The OpenSolaris installation process uses DDR2CMSX to restore a uncompressed stored disk image to a minidisk.

---

## The SOLDIST Virtual Machine

OpenSolaris for System z runs only as a guest of z/VM. A virtual machine entry similar to the one provided in SOLDIST DIRECT. A copy of SOLDIST DIRECT is included in this document as Appendix D, “Sample Directory Entry for SOLDIST” on page 29.

---

## Identifying Your Disk Requirements

OpenSolaris for System Z uses z/VM minidisks to contain Solaris file system data. The virtual machine requires two minidisks, to wit:

- Virtual address 191

This minidisk holds setup information and a CMS PROFILE EXEC used to start the virtual machine and configure it.

- Virtual address 200

This minidisk holds the other OpenSolaris file systems needed for a basic system.

The system also requires a disk device to be used for swapping and paging activity by the OpenSolaris kernel. This disk can be either real disk or virtual disk in storage (VDISK). The sample directory entry defines the following:

- Virtual address 201

Virtual disk in storage for swapping/paging activity by the OpenSolaris kernel. This disk can be allocated on regular DASD, but VDISK is recommended for performance reasons.

Review the release notes and the sample CP directory entry to determine the required minimum size for each minidisk.

### **Minidisk Sizing**

Note that the sample directory entry includes a modest overallocation to allow for limited growth using the default disk size. If additional applications and data are to be stored, the default disk allocation will not be sufficient. Additional disk space can be added using the procedure described in section “Adding Disk Space” on page 18 of this document.

You will also need an additional 3390 model 3 as a temporary work area during the installation. This work area is used to restore the tape files to disk during installation, and may be deleted following the installation. If you wish, an equivalent amount of space in a SFS file pool (approximately 2.2GB or about 600,000 4K blocks) is also suitable for this purpose.

---

## Identifying Your Networking Requirements

Networking support in OpenSolaris for System Z supports only virtual OSA adapters driven via DIAGnose 2A8 attached to a layer 2 VSWITCH. At least one virtual NIC is required to successfully use OpenSolaris. Use the CP virtual switch (VSWITCH) support to drive physical OSA adapters and use virtual NIC adapters defined in the CP directory entry (or dynamically defined and COUPLEd to a VSWITCH in the virtual machine PROFILE EXEC).

An example of the CP command necessary to define a layer 2 is shown in the following figure:

---

```
DEFINE VSWITCH RDEV nnnn CONNECT ETHERNET
```

---

Figure 1. CP DEFINE VSWITCH Command for Layer 2 VSWITCH

This command can also be placed in the z/VM CP SYSTEM CONFIG file with other CP configuration commands. See the reference section for details of how to access and manage the CP SYSTEM CONFIG file.

### **OpenSolaris Requires A Layer 2 VSWITCH**

You must use a layer 2 VSWITCH with OpenSolaris for System z. The networking device driver and the code that probes for devices will not initialize correctly if a layer 3 VSWITCH is used, and the system will not boot correctly if device detection fails.

Consult the sample directory entry for an example of defining a network adapter in the CP directory, or consult the z/VM TCP/IP Planning and Administration manual for additional information about setting up and configuring virtual switches on z/VM.

# Installation Reference Worksheet

## Disk Requirements

Table 1. Minidisk Requirements Worksheet						
Virtual Address	Mini-disk Label	Device Type	RESERVED Filename	EdSize (cyl or MB)	Filesystem Type (CMS or Unix)	Resident on CP Volume
0191	SOL191	ECKD	n/a	50 cyl	CMS	USRVL1
0200	SOL200	ECKD	SOL4Z FILESYS	3338 cyl	Unix	USRVL2
F000	SOLTMP	ECKD	Temp Work Area	3338 cyl	CMS	USRVL3

Note that the volids listed here are examples used to indicate that the minidisks should be placed on different physical volumes. There is no requirement to label or use physical volumes with the labels shown in the table -- use non-CP owned volumes that match the configuration and labeling standards used in your shop.

## Network Requirements

Table 2. Network Requirements Worksheet			
Attribute	Adapter 1	Adapter 2	Adapter 3
Virtual Address	0340		
VSWITCH Name			
DHCP?	Y/N	Y/N	Y/N
IP Address			
Netmask			
Def. Gateway			
DNS Servers			



---

# Installing OpenSolaris for System Z

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# Installing OpenSolaris From Tape

Use the following steps to perform a quick installation of OpenSolaris for System Z from the distribution tape. If you did not receive a physical tape with your install kit, refer to the release notes for instructions on creating a physical install tape from the tape image file on the DVD.

1. Log into your VM system as the MAINT userid, or as a userid with at least class E privileges.
2. Link and format the temporary disk you will use during installation. The commands (assuming the temporary disk is added to your userid as virtual device F000) might appear similar to:

```
LINK userid F000 F000 MR
FORMAT F000 Q
ACCESS F000 A
```

3. Mount the distribution tape on a available drive and attach the drive to your VM userid as device 181.
4. Load the sample VM directory entry for the SOLDIST userid and other documentation by typing:

```
TAPE LOAD * * A
```

The utilities and softcopy documentation files will be loaded to your A disk. Refer to the release notes for a complete listing of the tape contents and files in each physical tape file.

5. Edit the sample directory entry SOLDIST DIRECT according to your site conventions and create the userid according to your normal VM userid management regime.

**Elevated User Privileges Are Not Required**

The SOLDIST userid does not require any elevated user privileges and should be created as a class G user only. Do not give the SOLDIST userid additional CP privileges unless you understand precisely the risks and benefits.

6. If your directory management tool does not preformat minidisk space, link the SOLDIST minidisks and format the minidisks using the CMS FORMAT command. An example might look like:

```
LINK SOLDIST 191 F191 MR
LINK SOLDIST 200 F200 MR
FORMAT F191 Q
FORMAT F200 R
```

7. Load the SOLDIST 191 disk image to the temporary disk:

```
TAPE LOAD * * A
```

8. Uncompress the SOLDIST 191 disk image:

```
VMARC UNPACK SOL191 VMARC A = = a
```

9. Copy the SOLDIST 191 disk image to SOLDIST 191:

```
DDR2CMSX
SYSPRINT CONS
INPUT CMS SOL191 IMAGE A
OUTPUT F191 3390 SCRATCH
RESTORE ALL
YES
YES
<blank line>
```

10. Erase the SOLDIST 191 disk image file:

```
ERASE SOL191 IMAGE A
```

11. Load the SOLDIST 200 disk image to the temporary disk:

```
TAPE LOAD * * A
```

12. Uncompress the SOLDIST 200 disk image:

```
VMARC UNPACK SOL200 VMARC A = = A
```

13. Copy the SOLDIST 200 disk image to SOLDIST 200:

```
DDR2CMSX
SYSPRINT CONS
INPUT CMS SOL200 IMAGE A
OUTPUT F200 3390 SCRATCH
RESTORE ALL
YES
YES
<blank line>
```

14. Erase the SOLDIST 200 disk image file:

```
ERASE SOL200 IMAGE A
```

15. Load the initial ramdisk files from the 4th tape file by typing:

```
TAPE FSF 1
TAPE LOAD * * A
```

16. Uncompress the ramdisk image and tools using the following command:

```
VMARC UNPACK RAMDISK VMARC A * * A
```

17. Recreate the initial ramdisk NSS by typing: `SOLARIS SOLDIST`. This will build and save the NSS. If you are installing on a userid other than `SOLDIST`, replace `SOLDIST` with the userid that you are using.

18. Unload and detach the distribution tape.

```
TAPE RUN ( TAP1
DETACH 181
```

19. Release and detach the SOLDIST minidisks from your userid.

```
DETACH F191
DETACH F200
```

20. Print or copy the installation guide, release notes and other documentation (optional).

- If you wish to browse the documentation using CMS:

```
BROWSE RELNOTE2 TXTOUT      (release notes)
BROWSE INSTALL2 TXTOUT      (detail installation guide)
```

- If you wish to use Bookmaster/READ or IBM Library Reader:

Access your Bookmaster/READ application disk and examine the following files. If you use Library Reader on a laptop or workstation, transfer the files in BINARY mode and open them with the Library Reader application.

RELNOTE2 BOOK	(release notes)
INSTALL2 BOOK	(detail installation guide)

The remaining documents are supplied as text files only.

- If you wish to view the documents as Adobe Portable Document Format (PDF) files:

Download the following files to your laptop or workstation in BINARY mode and open them with a PDF viewer. The PDF files are compatible with PDF version 1.4 (Acrobat version 5 or later, or any compatible PDF reader).

RELNOTE2 PDFBIN	(release notes)
INSTALL2 PDFBIN	(detail installation guide)

---

# Installing OpenSolaris From DVD Files

Use the following steps to perform a quick installation of OpenSolaris for System Z from the files on the distribution DVD.

1. Log into your VM system as the MAINT userid, or as a userid with at least class E privileges.
2. Link and format the temporary disk you will use during installation. The commands (assuming the temporary disk is added to your userid as virtual device F000) might appear similar to:  

```
LINK userid F000 F000 MR  
FORMAT F000 Q  
ACCESS F000 A
```
3. Detach the work disk to allow the FTP server to obtain a write link by typing DETACH F000.
4. Insert the DVD into a workstation connected to a network reachable from the VM system.
5. Upload the first VMARC file to the z/VM system using FTP. and other documentation by typing commands similar to the following example.

### — FTP Client Syntax May Differ —

Note that some FTP clients (the default FTP client supplied with Windows is a prime example) do not correctly implement the FTP client standard. The examples shown here are performed using a Linux FTP client which correctly implements the standard. If you must use the Windows FTP client, prefix the SITE commands shown in the FTP examples with QUOTE, e.g.:

```
QUOTE SITE FIX 80
```

instead of:

```
SITE FIX 80
```

The examples shown in this section assume the DVD is mounted as filesystem /cdrom on the Linux workstation. If you have mounted the DVD using another mount point, you should adjust the file paths shown accordingly.

A sample FTP session may appear as follows (the \$ indicates the user command prompt):

```

$ ftp zvm.example.com
Connected to zvm.example.com.
220-FTPSERVE IBM VM Level 530 at ZVM.EXAMPLE.COM, 10:58:37 EST THU
220 Connection will close if idle for more than 5 minutes.
Name (zvm.example.com:user): maint
500 Unknown command, 'AUTH'
SSL not available
331 Send password please.
Password: <password>
230-MAINT logged in; working directory = MAINT 191 (ReadOnly)
230 write access currently unavailable
Remote system type is VM.
ftp> cd SOLDIST.F000
250-Working directory is SOLDIST F000 (ReadOnly)
250 for write access, send 'ACCT minidisk-mult-password'
ftp> quote acct write
250 Working directory is SOLDIST F000
ftp> site fix 80
200 Site command was accepted.
ftp> bin
200 Representation type is IMAGE.
ftp> put /cdrom/file1/file1.vmarc file1.vmarc
local: /cdrom/file1/file1.vmarc remote: file1.vmarc
200 Port request OK.
150 Storing file 'file1.vmarc'
250 Transfer completed successfully.
nnnn bytes sent in x.xx secs (y.y kB/s)
ftp> put /cdrom/file1/vmarc.inmod vmarc.inmod
local: /cdrom/file1/vmarc.inmod remote: vmarc.inmod
200 Port request OK.
150 Storing file 'vmarc.inmod'
250 Transfer completed successfully.
nnnn bytes sent in x.xx secs (y.y kB/s)
ftp> put /cdrom/file1/soldist.direct soldist.direct
local: /cdrom/file1/soldist.direct remote: soldist.direct
200 Port request OK.
150 Storing file 'soldist.direct'
250 Transfer completed successfully.
nnnn bytes sent in x.xx secs (y.y kB/s)
ftp> quit
221 Quit command received. Goodbye.
$

```

The utilities, sample directory entry and softcopy documentation files will be loaded to the SOLDIST F000 work disk. Refer to the release notes for a complete listing of the contents and files in each directory on the DVD.

6. Edit the sample directory entry SOLDIST DIRECT according to your site conventions and create the userid according to your normal VM userid management regime.

**Elevated User Privileges Are Not Required**

The SOLDIST userid does not require any elevated user privileges and should be created as a class G user only. Do not give the SOLDIST userid additional CP privileges unless you understand precisely the risks and benefits.

7. Relink the SOLDIST F000 minidisk by typing LINK SOLDIST F000 F000 MR at your CMS ready prompt.

8. Reaccess the minidisk as filemode A by typing ACCESS F000 A.
9. Reformat the VMARC module to make it executable by running the following command:

```
PIPE < VMARC INMOD A | DEBLOCK CMS | > VMARC MODULE A
```

You can erase VMARC INMOD A at your convenience.

10. If your directory management tool does not preformat minidisk space, link the SOLDIST minidisks and format the minidisks using the CMS FORMAT command. An example might look like:

```
LINK SOLDIST 191 F191 MR
LINK SOLDIST 200 F200 MR
FORMAT F191 Q
FORMAT F200 R
```

11. Load the SOLDIST 191 disk image to the temporary disk by repeating the release/FTP/relink steps shown immediately above. The file /cdrom/file2/sol191.vmarc contains this disk image.

12. Uncompress the SOLDIST 191 disk image:

```
VMARC UNPACK SOL191 VMARC A = = a
```

13. Copy the SOLDIST 191 disk image to SOLDIST 191:

```
DDR2CMSX
SYSPRINT CONS
INPUT CMS SOL191 IMAGE A
OUTPUT F191 3390 SCRATCH
RESTORE ALL
YES
YES
<blank line>
```

14. Erase the SOLDIST 191 disk image file:

```
ERASE SOL191 IMAGE A
```

15. Load the SOLDIST 200 disk image to the temporary disk by repeating the release/FTP/relink steps shown above. The file /cdrom/file3/sol200.vmarc contains this disk image.

16. Uncompress the SOLDIST 200 disk image:

```
VMARC UNPACK SOL200 VMARC A = = A
```

17. Copy the SOLDIST 200 disk image to SOLDIST 200:

```
DDR2CMSX
SYSPRINT CONS
INPUT CMS SOL200 IMAGE A
OUTPUT F200 3390 SCRATCH
RESTORE ALL
YES
YES
<blank line>
```

18. Erase the SOLDIST 200 disk image file:

```
ERASE SOL200 IMAGE A
```

19. Load the initial ramdisk image to the temporary disk by repeating the release/FTP/relink steps shown above. The file /cdrom/file4/rasol200.vmarc contains these files.

20. Uncompress the ramdisk image and tools using the following command:

```
VMARC UNPACK RAMDISK VMARC A * * A
```

21. Recreate the initial ramdisk NSS by typing: SOLARIS SOLDIST. This will build and save the NSS. If you are installing on a userid other than SOLDIST, replace SOLDIST with the userid that you are using.

22. Remove the DVD from your workstation DVD drive.

23. Release and detach the SOLDIST minidisks from your userid.

```
DETACH F191  
DETACH F200
```

24. Print or copy the installation guide, release notes and other documentation (optional).

- If you wish to browse the documentation using CMS:

```
BROWSE RELNOTE2 TXTOUT          (release notes)  
BROWSE INSTALL2 TXTOUT         (detail installation guide)
```

- If you wish to use Bookmaster/READ or IBM Library Reader:

Access your Bookmaster/READ application disk and examine the following files. If you use Library Reader on a laptop or workstation, transfer the files in BINARY mode and open them with the Library Reader application.

```
RELNOTE2 BOOK                   (release notes)  
INSTALL2 BOOK                   (detail installation guide)
```

The remaining documents are supplied as text files only.

- If you wish to view the documents as Adobe Portable Document Format (PDF) files:

Download the following files to your laptop or workstation in BINARY mode and open them with a PDF viewer. The PDF files are compatible with PDF version 1.4 (Acrobat version 5 or later, or any compatible PDF reader).

```
RELNOTE2 PDFBIN                 (release notes)  
INSTALL2 PDFBIN                 (detail installation guide)
```

You have completed the installation of the OpenSolaris for System Z prototype.

To start the newly installed OpenSolaris for System z guest:

1. Log in to the SOLDIST userid using the password defined in the CP directory.
2. Type: IPL 191. The system will begin initialization.
3. Watch for the login: prompt to appear. If you do not see it after a reasonable time (a minute or two), press Enter to cause one to appear.

Customization information can be found in the release notes files on the temporary disk or on the first file of the distribution tape.

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# Customizing OpenSolaris for System Z

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# Customizing An OpenSolaris Virtual Machine

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## Initial Network Configuration

Following the installation, you will need to configure the network to allow initial access to the system. Permanent network configuration should be performed using the Solaris network configuration commands and processes documented in the Solaris manuals.

To perform initial setup of the OSA virtual interface, use the following steps:

1. Complete the installation as described in this document.
2. Log into the SOLDIST userid on the z/VM console.
3. Log into OpenSolaris system as root.
4. Type:

```
ifconfig osa0 <ip-address> netmask <netmask>  
route add default <ip-addr-for-default-gw>
```

These commands will enable you to telnet or ssh to the system and use full-screen tools such as vi to complete the configuration.

5. Disconnect from the z/VM login session using #CP DISC.
6. Connect to the guest IP address using telnet or ssh from your workstation.
7. Log in as the root user. The password for the distribution kit is provided in the release notes.
8. Make the permanent network configuration changes by editing /etc/hostname.osa0 with vi.
9. Make the default route changes by editing /etc/defaultrouter to indicate the permanent default route.
10. Shut down the image and restart.

---

## Changing the Root Password

The system image is created with a default root password shown in the release notes. You should change this password immediately following installation.

The supplied password may be changed using the passwd command. Consult the Solaris documentation for information on using the passwd command.

---

## Adding Disk Space

To add disk space to a OpenSolaris guest::

1. Allocate a new minidisk to the guest userid using your local disk management procedures. Ensure that you add link passwords or appropriate rules in your external security manager (ESM) to permit your userid to link the newly created minidisk.

### OpenSolaris Must Use Minidisks

The OpenSolaris system must use minidisks. Attached volumes or SFS/BFS space is not supported.

2. Link the newly created minidisk on your normal VM userid in MR or WR mode.

3. Format the new minidisk using the CMS FORMAT command, eg:

```
format 199 f
DMSFOR603R FORMAT will erase all files on disk F(199).
Do you wish to continue?
Enter 1 (YES) or 0 (NO).
1
DMSFOR605R Enter disk label:
BOOT
DMSFOR733I Formatting disk F
DMSFOR732I 100 cylinders formatted on F(199)
R;
```

4. Create a reserved area on the minidisk by using the CMS RESERVE command:

```
Ready; T=0.09/0.13 19:43:48
reserve solaris data f
DMSRSV603R RESERVE will erase all files on disk F(199).
Do you wish to continue? Enter 1 (YES) or 0 (NO).
1
DMSRSV733I Reserving disk F
Ready; T=0.01/0.01 19:44:07
| * * F
SOLARIS DATA F6
Ready; T=0.01/0.01 19:44:12
```

5. Detach the minidisk from your userid.

6. Shut down and log off the OpenSolaris guest.

7. Log the OpenSolaris guest back on.

The new disk will be detected at startup and you can create a file system on it as described in the Solaris documentation.

---

## Additional z/VM Customization Tasks

Please refer to the z/VM documentation set for additional information on configuring and tuning z/VM to host OpenSolaris virtual machines. Much of the material referring to Linux (particularly the discussion about virtual memory and sizing of virtual machines) is applicable to OpenSolaris virtual machines as well.

---

## Additional OpenSolaris Customization Tasks

Please refer to the Solaris Administration Guide available from Sun for additional OpenSolaris configuration tasks and procedures.



---

# OpenSolaris Installation Tools and Commands

---

# OpenSolaris Installation Tools

---

## VMARC MODULE

The VMARC program was originally created by John Fisher at RPI. VMARC is a data compaction and file archiving utility for VM/CMS. Files stored in VMARC archives are compressed to make more efficient use of disk space and network bandwidth, and are not directly usable by applications.

---

## DDR2CMSX MODULE

This program is part of the CMSDDR package available in the IBM online VM Download Library. The original contributor is Gerhard Widener of IBM. The description of the tool provided by the author is: “This package provides you with a kind of I/O redirection for DDR tapes into CMS files via a modified DDR module. It comes with a sample EXEC to perform DDR DUMP and RESTOREs for minidisks. A help file explaining the additional features is included, too. Source code changes are not provided. ”

---

# Diagnosis and Problem Determination

---

# Diagnosis and Problem Determination

---

## OpenSolaris Application Problems

OpenSolaris application problems should be debugged using traditional Unix debugging techniques using `dbx` or `gdb`. Refer to a Unix application development book or the *Sun Studio: Debugging a Program with dbx* manual for your release for more information on Unix debugging.

---

## OpenSolaris Operating System Problems

In this release, debugging and problem determination are performed using standard z/VM tools such as spooled console logs and the output from the `CP VMDUMP` command.

In this release, kernel errors automatically generate a virtual machine dump via the `VMDUMP` command. These dumps can be found in the virtual card reader of the OpenSolaris guest system, and can be processed according to the instructions in the z/VM Problem Determination manual. If you have a problem that you cannot attribute to a OpenSolaris application-based cause, use the following procedure to capture information about the problem for submission with the problem report:

1. Log into the virtual machine and type:

---

```
#CP SPOOL CONSOLE TO userid START
```

---

Figure 2. Starting Virtual Machine Console Spooling for PD

2. If the virtual machine was already running, type `BEGIN` to resume execution. If the virtual machine was not already running, type `IPL CMS PARM AUTOCR` to initiate normal startup. Remain logged in to the console of the virtual machine to facilitate entering additional debugging commands.
3. If you know how, reproduce the problem.
4. **As the first command following the failure**, type:

---

```
#CP VMDUMP 0-END TO *
```

---

Figure 3. Dumping A Failed Virtual Machine

5. Contact Sine Nomine via electronic mail using the SOL-390 mailing list at `sol-390@vm.marist.edu`.

---

# Appendices

---

## Appendix A. Installation Tape Contents

The installation tape contains four physical files, with multiple files dumped using the CMS TAPE DUMP command. The contents are:

```
<< ----- BOT          ----->>
VMARC distribution
CMSDDR distribution
all OpenSolaris documentation files in text, BOOK and PDF formats
SOLDIST DIRECT
<< ----- tape mark ----->>
SOL191  VMARC
<< ----- tape mark ----->>
SOL200  VMARC
<< ----- tape mark ----->>
RAMDISK VMARC
<< ----- tape mark ----->>
<< ----- tape mark ----->>
<< ----- EOT          ----->>
```

---

## Appendix B. Installation DVD Contents

The installation DVD contains individual files and VMARC archives. The contents are:

VMARC INMOD  
VMARC distribution  
CMSDDR distribution  
all OpenSolaris documentation files in text, BOOK and PDF formats  
SOLDIST DIRECT  
SOL191 VMARC  
SOL200 VMARC  
RAMDISK VMARC  
MISC VMARC  
PHASE6 AWSTAPE  
DETAPE EXEC  
DETAPEM EXEC

---

## Appendix C. Summary of Changes

---

### Phase 2

- Created document.

---

### Phase 3

- Added DVD description and installation process documentation.
- Added initial and permanent network setup instructions.
- Added references to new information in release notes.
- Added procedure to change root password after install.

---

### Phase 4

- Updated references to phase 3

---

### Post-Release 1.0 (build 95)

Updated documentation to reflect fixes post-phase 4.

First public release.

---

### Build 100 (March 2009)

Second public release.

Incorporate following documentation modifications and/or suggestions:

6598 Doc references SOLDIST 150 instead of 200

6600 Suggestion: Use disk other than 191 for IPL (Raymond Noal, HDS)

6599 Suggestion: Use additional work disk (Raymond Noal, HDS)

---

## Appendix D. Sample Directory Entry for SOLDIST

The following is a copy of the sample CP directory entry for the OpenSolaris virtual machine. This file is provided in electronic form on both types of installation media as SOLDIST DIRECT.

The sample directory entry is:

```

USER SOLDIST xxxxxxxx 512M 2G GE
*
* Sample directory entry for OpenSolaris for System z
* guest user. Class E needed to allow saving NSS.
*
*
* Define multiple virtual CPUs
*
CPU 00 BASE
CPU 01
*
* The OpenSolaris code does not yet employ crypto hardware, but
* define one for future use
*
CRYPTO APVIRT
*
* Initially IPL CMS, to allow setup and then jump into OpenSolaris
* Add a PARM AUTOOCR when you're satisfied with the PROFILE EXEC
* and other virtual machine startup options
*
IPL CMS
*
* Allow IUCV traffic for future management use
*
IUCV ANY PRIORITY MSGLIMIT 2000
IUCV ALLOW
*
* Allow defining up to 32 virtual CPUs. OpenSolaris can handle
* up to 64 CPUs, but IBM doesn't allow that many CPUs in a LPAR...
* so, no point in simulating it.
*
MACHINE ESA 32
*
* Allow virtual machine to set it's TOD clock
*
OPTION TODENABLE
*
* Define linemode 3215 console device
*
CONSOLE 0009 3215 T
*
* Define network adapter. Replace XXXXXX with appropriate VSWITCH name
*
NICDEF 0BC0 TYPE QDIO LAN SYSTEM xxxxxxx
*
* Usual CMS spooled devices and LINKs
* Virtual punch required to allow VMDUMP to work.
*
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
LINK TCPMAINT 0592 0592 RR
*
* Minidisk definitions -- note that the examples here
* are commented out; replace them with definitions that

```

```
* match your local policy. You also may not need all three
* full-pack mod 3 disks, depending on your usage. In the
* development process 201 and 202 were used to do file transfer
* and are not needed (or can be repurposed to supply /home and /var
* filesystems).
*
* Suggested minidisk sizes allow for some growth, but
* will not be sufficient for production use.
*
* Boot disk and CMS utilities for managing OpenSolaris
*
* MDISK 191 3390 nnnn 50   vvvvvv RR rpass wpass mpass
*
* OpenSolaris root filesystem
*
* MDISK 200 3390 0001 3338 vvvvvv MR rpass wpass mpass
*
* Minidisk 201 is intended for swapfile usage
*
* MDISK 201 FB-512 V-DISK 600000 MR rpass wpass mpass
*
* Additional OpenSolaris filesystem space
*
* MDISK 202 3390 0001 3338 vvvvvv MR rpass wpass mpass
*
```

---

## **Appendix E. Glossary of Terms and Abbreviations**

Glossary terms will be added based on phase 2 and 3 feedback from testers.

---

# Appendix F. Bibliography

---

## Related Publications

This section describes additional IBM and Sun books and online documentation that can help you plan, install, customize and administer your system. If you do not find the references you need please submit a written comment to [support@sinenomine.net](mailto:support@sinenomine.net).

## z/VM Books and Information

Most IBM manuals and z/VM books are available online at <http://www.vm.ibm.com/library> in HTML and PDF formats.

- Planning
  - z/VM 5.3 General Information (GC24-6095)
  - z/VM 5.3 I/O Configuration (SC24-6100)
  - z/VM 5.3 Getting Started with Linux on System z9 and zSeries (SC24-6096)
  - z/VM 5.3 CP Planning and Administration (SC24-6083)
  - z/VM 5.3 Running Guest Operating Systems (SC24-6115)
- Installation

No IBM z/VM books or documents apply to Solaris installation.
- Customization
  - z/VM 5.1 CMS Primer (SC24-6137)
  - z/VM 5.1 XEDIT Commands and Macros Reference (SC24-6131)
  - z/VM 5.3 CP Commands and Utilities (SC24-6081)
  - z/VM 5.3 CMS Commands and Utilities Reference (SC24-6073)
  - z/VM 5.3 Directory Maintenance Facility Tailoring and Administration Guide (SC24-6135)
  - z/VM 5.3 TCP/IP Planning and Customization (SC24-6125)
  - z/VM 5.3 REXX/VM User's Guide (SC24-6114)
- Administration
  - z/VM 5.3 Performance (SC24-6109)
  - z/VM 5.3 Diagnosis Guide (GC24-6092)
  - z/VM 5.3 CP Messages and Codes (GC24-6119)
  - z/VM 5.3 CMS Messages and Codes (GC24-6118)
  - z/VM 5.3 VM Dump Tool (GC24-6129)

## Sun Solaris and Solaris Books and Information

Most Sun manuals are available online at <http://www.docs.sun.com/app/docs> in HTML and PDF formats.

- Planning
  - System Administrator Guide: Basic Administration
  - System Administrator Guide: Advanced Administration
  - System Administrator Guide: IP Services
  - Solaris ZFS Administration Guide
- Installation
  - System Administrator Guide: Basic Administration
  - System Administrator Guide: Advanced Administration
- Customization
  - System Administrator Guide: Basic Administration
  - System Administrator Guide: Advanced Administration
- Administration
  - System Administrator Guide: Basic Administration
  - System Administrator Guide: Advanced Administration

## Online Articles and References

- Mailing Lists
  - No mailings lists are available at this time.
- z/VM WWW Sites
  - [www.vm.ibm.com](http://www.vm.ibm.com)

This is the main IBM WWW site for z/VM information. The site contains information about the z/VM hypervisor, documentation, white papers and other helpful configuration information and tips.
- Solaris and OpenSolaris WWW Sites
  - [www.opensolaris.org](http://www.opensolaris.org)

This is the site documenting the OpenSolaris project and code distributions. The message boards and reference information stored here is helpful in debugging and other tasks related to Solaris and OpenSolaris releases.
  - [www.sun.com](http://www.sun.com)

The general Sun Microsystems WWW site.
  - [docs.sun.com](http://docs.sun.com)

Sun online documentation.