System Administration Guide: Solaris 9 Containers

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Contents

Preface

This guide covers the Solaris™ 9 Containers 1.0.1 and Solaris 9 Containers 1.0 products. To use either version, you must install the correct Solaris 10 release, as described in this document, and set up any networking software that you plan to use.

Related Companion Book

For additional information not in this guide, also refer to the *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*. That book provides a complete overview of Solaris Zones and branded zones. See "General Zones Concepts" on page 13 for specific topics you might need to review.

Who Should Use This Book

This book is intended for anyone responsible for administering one or more systems that run the Solaris 10 release. To use this book, you should have at least 1 to 2 years of UNIX® system administration experience.

How the System Administration Volumes Are Organized

Here is a list of the topics that are covered by the volumes of the System Administration Guides.

Book Title	Topics
System Administration Guide: Basic Administration	User accounts and groups, server and client support, shutting down and booting a system, managing services, and managing software (packages and patches)
System Administration Guide: Advanced Administration	Printing services, terminals and modems, system resources (disk quotas, accounting, and crontabs), system processes, and troubleshooting Solaris software problems

Book Title	Topics
System Administration Guide: Devices and File Systems	Removable media, disks and devices, file systems, and backing up and restoring data
System Administration Guide: IP Services	TCP/IP network administration, IPv4 and IPv6 address administration, DHCP, IPsec, IKE, IP filter, Mobile IP, IP network multipathing (IPMP), and IPQoS
System Administration Guide: Naming and Directory Services (DNS, NIS, and LDAP)	DNS, NIS, and LDAP naming and directory services, including transitioning from NIS to LDAP and transitioning from NIS+ to LDAP
System Administration Guide: Naming and Directory Services (NIS+)	NIS+ naming and directory services
System Administration Guide: Network Services	Web cache servers, time-related services, network file systems (NFS and Autofs), mail, SLP, and PPP
System Administration Guide: Security Services	Auditing, device management, file security, BART, Kerberos services, PAM, Solaris cryptographic framework, privileges, RBAC, SASL, and Solaris Secure Shell
System Administration Guide: Solaris Containers-Resource Management and Solaris Zones	Resource management topics projects and tasks, extended accounting, resource controls, fair share scheduler (FSS), physical memory control using the resource capping daemon (`rcapd`), and resource pools; virtualization using Solaris Zones software partitioning technology
Solaris ZFS Administration Guide	ZFS storage pool and file system creation and management, snapshots, clones, backups, using access control lists (ACLs) to protect ZFS files, using Solaris ZFS on a Solaris system with zones installed, emulated volumes, and troubleshooting and data recovery

Related Third-Party Web Site References

Third-party URLs are referenced in this document and provide additional, related information.

Note – Sun is not responsible for the availability of third-party web sites mentioned in this document. Sun does not endorse and is not responsible or liable for any content, advertising, products, or other materials that are available on or through such sites or resources. Sun will not be responsible or liable for any actual or alleged damage or loss caused or alleged to be caused by or in connection with use of or reliance on any such content, goods, or services that are available on or through such sites or resources.

Documentation, Support, and Training

The Sun web site provides information about the following additional resources:

- Documentation (`http://www.sun.com/documentation/`)
- Support (`http://www.sun.com/support/`)
- Training (`http://www.sun.com/training/`)

Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P–1 Typographic Conventions

Typeface	Meaning	Example
`AaBbCc123`	The names of commands, files, and directories, and onscreen computer output	Edit your `.login` file. Use `ls -a` to list all files. `machine_name% you have mail.`
`AaBbCc123`	What you type, contrasted with onscreen computer output	`machine_name%` **`su`** `Password:`
aabbcc123	Placeholder: replace with a real name or value	The command to remove a file is `rm` *filename*.
AaBbCc123	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the *User's Guide*. A *cache* is a copy that is stored locally. Do *not* save the file. **Note:** Some emphasized items appear bold online.

Shell Prompts in Command Examples

The following table shows the default UNIX system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P–2 Shell Prompts

Shell	Prompt
C shell	`machine_name%`
C shell for superuser	`machine_name#`
Bourne shell and Korn shell	`$`
Bourne shell and Korn shell for superuser	`#`

◆ ◆ ◆ CHAPTER 1

Introduction to Solaris 9 Containers

BrandZ provides the framework to create containers that contain non-native operating environments. These containers are branded zones used in the Solaris™ Operating System to run applications that cannot be run in a native environment. The brand described here is the `solaris9` brand, Solaris 9 Containers.

Note – If you want to create `solaris9` zones now, go to "Assess the Solaris 9 System" on page 21.

About Branded Zones

By default, a non-global zone has the same characteristics as the operating system in the global zone, which is running the Solaris 10 Operating System or later Solaris 10 release. These *native* non-global zones and the global zone share their conformance to standards, runtime behavior, command sets, and performance traits in common.

It is also possible to run a different operating environment inside of a non-global zone. The branded zone (BrandZ) framework extends the Solaris Zones infrastructure to include the creation of brands, or alternative sets of runtime behaviors. *Brand* can refer to a wide range of operating environments. For example, the non-global zone can emulate another version of the Solaris Operating System, or an operating environment such as Linux. Or, it might augment the native brand behaviors with additional characteristics or features. Every zone is configured with an associated brand.

The brand defines the operating environment that can be installed in the zone and determines how the system will behave within the zone so that the non-native software installed in the zone functions correctly. In addition, a zone's brand is used to identify the correct application type at application launch time. All branded zone management is performed through extensions to the native zones structure. Most administration procedures are identical for all zones.

You can change the brand of a zone in the *configured* state. Once a branded zone has been *installed*, the brand cannot be changed or removed.

BrandZ extends the zones tools in the following ways:

- The `zonecfg` command is used to set a zone's brand type when the zone is configured.
- The `zoneadm` command is used to report a zone's brand type as well as administer the zone.

Note – Although you can configure and install branded zones on a Solaris Trusted Extensions system that has labels enabled, you cannot boot branded zones on this system configuration.

Components Defined by the Brand

The following components available in a branded zone are defined by the brand.

- The privileges.
- Device support. A brand can choose to disallow the addition of any unsupported or unrecognized devices. Devices can be added to `solaris9` non-global zones. See "About Solaris 9 Branded Zones" on page 14.
- The file systems required for a branded zone are defined by the brand. You can add additional Solaris file systems to a branded zone by using the `fs` resource property of `zonecfg`.

Processes Running in a Branded Zone

Branded zones provide a set of interposition points in the kernel that are only applied to processes executing in a branded zone.

- These points are found in such paths as the `syscall` path, the process loading path, and the thread creation path.
- At each of these points, a brand can choose to supplement or replace the standard Solaris behavior.

A brand can also provide a plug-in library for `librtld_db`. The plug-in library allows Solaris tools such as the debugger, described in `mdb(1)`, and DTrace, described in `dtrace(1M)`, to access the symbol information of processes running inside a branded zone.

General Zones Characteristics

The container provides a virtual mapping from the application to the platform resources. Zones allow application components to be isolated from one another even though the zones share a single instance of the Solaris Operating System. Resource management features permit you to allocate the quantity of resources that a workload receives.

The container establishes boundaries for resource consumption, such as CPU utilization. These boundaries can be expanded to adapt to changing processing requirements of the application running in the container.

General Zones Concepts

For additional information not in this guide, also refer to the *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*. That book provides a complete overview of Solaris Zones and branded zones.

You should be familiar with the following zones and resource management concepts, which are discussed in the guide:

- Supported and unsupported features
- Resource controls that enable the administrator to control how applications use available system resources
- Commands used to configure, install, and administer zones, primarily `zonecfg`, `zoneadm`, and `zlogin`
- The global zone and the non-global zone
- The whole-root non-global zone model
- The global administrator and the zone administrator
- The zone state model
- The zone isolation characteristics
- Privileges
- Networking
- Zone IP types, exclusive-IP and shared-IP
- The Solaris Container concept, which is the use of resource management features, such as resource pools, with zones
- The fair share scheduler (FSS), a scheduling class that enables you to allocate CPU time based on shares
- The resource capping daemon (`rcapd`), which can be used from the global zone to control resident set size (RSS) usage of branded zones

About Solaris 9 Branded Zones

A Solaris 9 branded zone (`solaris9`) is a complete runtime environment for Solaris 9 applications on SPARC machines running the Solaris 10 8/07 Operating System or later. The brand supports the execution of 32-bit and 64-bit Solaris 9 applications.

`solaris9` branded zones are based on the whole root zone model. Each zone's file system contains a complete copy of the software that comprises the operating system. However, `solaris9` zones are different from native whole root zones in that central patching is not applied.

Solaris 10 Features Available to Zones

Many Solaris 10 capabilities are available to the `solaris9` zones, including the following:

- Fault management architecture (FMA) for better system reliability (see `smf(5)`.
- The ability to run on newer hardware that Solaris 9 does not support.
- Solaris 10 performance improvements.
- DTrace, run from the global zone, can be used to examine processes in `solaris9` zones.

Limitations

Some functionality available in Solaris 9 is not available inside of Solaris Zones.

General Non-Global Zone Limitations

The following features cannot be configured in a non-global zone:

- Solaris Live Upgrade boot environments
- Solaris Volume Manager metadevices
- DHCP address assignment in a shared-IP zone
- SSL proxy server

In addition, a non-global zone cannot be an NFS server, and dynamic reconfiguration (DR) operations can only be done from the global zone.

Limitations Specific to `solaris9` Branded Zones

The following limitations apply to `solaris9` branded zones:

- Solaris Auditing and Solaris Basic Security Module Auditing, described in `bsmconv(1M)` and `auditon(2)`, are not supported. The audit subsystem will always appear to be disabled.
- The CPU performance counter facility described in `cpc(3CPC)` is not available.

- The following disk and hardware related commands do not work:
  - `add_drv`(1M)
  - `disks`(1M)
  - `format`(1M)
  - `fdisk`(1M)
  - `prtdiag`(1M)
  - `rem_drv`(1M)

The following DTrace providers do not work:

- `plockstat`
- `pid`

Using ZFS

Although the zone cannot use a delegated ZFS dataset, the zone can reside on a ZFS file system. You can add a ZFS file system to share with the global zone through the `zonecfg fs` resource. See Step 7 in "How to Configure a `solaris9` Branded Zone" on page 27.

Note that the `setfacl` and `getfacl` commands cannot be used with ZFS. When a `cpio` archive with ACLs set on the files is unpacked, the archive will receive warnings about not being able to set the ACLs, although the files will be unpacked successfully. These commands can be used with UFS.

Adding Components

You can add the following components to a `solaris9` branded zone through the `zonecfg` command:

- You can add additional Solaris file systems to a branded zone by using the `fs` resource. For examples, see "How to Configure the Zone" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.
- Devices can be added to a `solaris9` non-global zone by using the `device` resource. For information about adding devices, see Chapter 18, "Planning and Configuring Non-Global Zones (Tasks)," in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*. To learn more about device considerations in non-global zones, see "Device Use in Non-Global Zones" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.
- Privileges can be added to a `solaris9` non-global zone by using the `limitpriv` resource. For information about adding privileges, see Chapter 18, "Planning and Configuring Non-Global Zones (Tasks)," in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*"Privileges in a Non-Global Zone" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

- You can specify network configurations. For more information, see "Preconfiguration Tasks" on page 25, "Networking in Shared-IP Non-Global Zones" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* and "Solaris 10 8/07: Networking in Exclusive-IP Non-Global Zones" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*
- You can use various resource control features. For more information, see Chapter 17, "Non-Global Zone Configuration (Overview)," in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*, Chapter 18, "Planning and Configuring Non-Global Zones (Tasks)," in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*, and Chapter 26, "Solaris Zones Administration (Overview)," in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

Ability to Directly Migrate Installed Systems Into Zones

An existing Solaris 9 system can be directly migrated into a `solaris9` branded zone. For more information, see "Creating the Image for Directly Migrating Solaris 9 Systems Into Zones" on page 22.

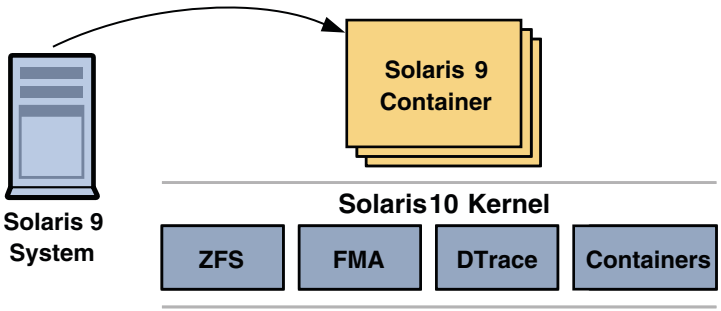

FIGURE 1–1 Solaris 9 System Migrated Into a `solaris9` Zone

◆ ◆ ◆ CHAPTER 2

Obtaining and Installing the Software

This chapter discusses the following topics:

- The product versions available for download and associated system requirements
- How to download the media to the Solaris 10 host and install the Solaris 9 Containers product.

Software Download

Instructions for downloading the Solaris 9 container product are available here (`http://www.sun.com/download/`).

The software download site for patches is SunSolve (`http://sunsolve.sun.com`). On that site, you can view the download instructions and download the images.

Solaris 9 Containers Versions and System Requirements

The Solaris 9 Containers software can be installed on a SPARC system running at least the Solaris 10 8/07 release.

The product media contains the following versions:

- Solaris 9 Containers 1.0.1, for systems running:
  - Solaris 10 10/08 or later
  - Kernels 137137-07 or later
- Solaris 9 Containers 1.0, for systems running:

- Solaris 10 8/07, with required Solaris patch 127111-01 or later applied
- Solaris 10 5/08
- Kernels 127111 (all versions)
- Kernels 127127 (all versions)
- Kernels 137111 (all versions)

The packages in the media have been updated to include the latest functionality in Solaris 9 Containers patch 138899-01.

The product download also includes a `README` file containing installation instructions for both versions, and a sample Solaris 9 flash archive image provided for validation purposes.

▼ Installing the Solaris 9 Containers 1.0.1 Software on the Solaris 10 Host System

The `SUNWs9brandr` and `SUNWs9brandu` packages should be installed during the Solaris system installation. If not already installed, the packages are available from the Solaris 10 10/08 media. See step 3.

1 Become superuser, or assume the Primary Administrator role.

2 Install the Solaris 10 10/08 release on the target system. See the Solaris 10 10/08 Release and Installation Collection (`http://docs.sun.com`).

3 If not already present on the system, install the packages `SUNWs9brandr` and `SUNWs9brandu` in the following order.

```
# pkgadd -d /path/to/media SUNWs9brandr
...
Installation of <SUNWs9brandr> was successful.
# pkgadd -d /path/to/media SUNWs9brandu
...
Installation of <SUNWs9brandu> was successful.
...
```

These packages are available from the Solaris 10 10/08 media.

4 Install the package `SUNWs9brandk`.

```
# pkgadd -d /path/to/media/s9containers-bundle/1.0.1/Product SUNWs9brandk
...
Installation of <SUNWs9brandk> was successful.
```

The file is available for download from the Software Download Center (SDLC) page for the Solaris 9 Containers 1.0.1 product.

5 **(Optional) If you plan to install the zone by using the sample `solaris9` system image archive, `solaris9-image.flar`, the file is available for download from the Software Download Center (SDLC) page for the Solaris 9 Containers 1.0.1 product. Copy the file either to the Solaris 10 system, or to an NFS server accessible to the system.**

See Also If you need more information about installing patches and packages, see Chapter 24, "About Packages and Patches on a Solaris System With Zones Installed (Overview)," in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* and Chapter 25, "Adding and Removing Packages and Patches on a Solaris System With Zones Installed (Tasks)," in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

Aspects of central patching covered in these chapters do not apply to `solaris9` branded zones.

▼ Installing the Solaris 9 Containers 1.0 Software on the Solaris 10 Host System

1 **Become superuser, or assume the Primary Administrator role.**

2 **Install the Solaris 10 8/07 or Solaris 10 5/08 on the target system. See the Solaris 10 8/07 Release and Installation Collection or Solaris 10 5/08 Release and Installation Collection (`http://docs.sun.com`).**

3 **(Solaris 10 8/07 release only) Install the patch 127111-01 or later in the global zone and reboot. The patch is available from SunSolve (`http://sunsolve.sun.com`).**

```
global# patchadd 127111-01
```

To view the patch on the system, use:

```
patchadd -p | grep 127111-01
```

Note – See "Solaris 9 Containers Versions and System Requirements" on page 17 for more information.

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4 **Install the packages `SUNWs9brandr`, `SUNWs9brandu`, and `SUNWs9brandk` in the following order.**

```
# pkgadd -d /path/to/media SUNWs9brandr
...
Installation of <SUNWs9brandr> was successful.
# pkgadd -d /path/to/media SUNWs9brandu
...
Installation of <SUNWs9brandu> was successful.
# pkgadd -d /path/to/media SUNWs9brandk
```

```
...
Installation of <SUNWs9brandk> was successful.
```

The file is available for download from the Software Download Center (SDLC) page for the Solaris 9 Containers 1.0.1 product.

5 **(Optional) If you plan to install the zone by using the sample `solaris9` system image archive, `solaris9-image.flar`, the file is available for download from the Software Download Center (SDLC) page for the Solaris 9 Containers 1.0.1 product. Copy the file either to the Solaris 10 system, or to an NFS server accessible to the system.**

See Also If you need more information about installing patches and packages, see Chapter 24, "About Packages and Patches on a Solaris System With Zones Installed (Overview)," in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* and Chapter 25, "Adding and Removing Packages and Patches on a Solaris System With Zones Installed (Tasks)," in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

Aspects of central patching covered in these chapters do not apply to `solaris9` branded zones.

◆ ◆ ◆ CHAPTER 3

Assessing a Solaris 9 System and Creating an Archive

This chapter discusses acquiring information about the Solaris 9 system and creating the archive of the Solaris 9 system.

Assess the Solaris 9 System

Examine the source system and collect needed information.

- Obtain the hostname:

  ```
  hostname
  ```

- Obtain the host ID:

  ```
  hostid
  ```

  Also see "Host ID Emulation" on page 23.

- Obtain the RPC `domainname`:

  ```
  domainname
  ```

- Obtain the root password.
- View the software being run on the system:

  ```
  ps -ef
  ```

- Check the networking utilized on the system:

  ```
  ifconfig -a
  ```

- View the storage utilized, for example, by viewing the contents of `/etc/vfstab`.
- View the amount of local disk storage in use, which determines the size of the archive:

  ```
  df -k
  ```

- Determine the patches that are on the system:

  ```
  patchadd -p
  ```

- Examine the contents of `/etc/system`.

Creating the Image for Directly Migrating Solaris 9 Systems Into Zones

You can use the Flash Archiving tools to create an image of an installed Solaris 9 system that can be migrated into a zone. If your Solaris 9 system is patched to the latest recommended list and the `SUNWinst` package is installed, you already have these tools installed.

The image can be fully configured with all of the software that will be run in the zone. This image is used by the installer when the zone is installed.

See Example 5–1 for information on the installer.

▼ How to Use `flarcreate` to Create the Image

Use this process to create the Solaris 9 system image. This example procedure uses NFS to place the flash archive on the target Solaris 10 system, but you could use any method to move the files.

You must be the global administrator in the global zone to perform this procedure.

1 Become superuser, or assume the Primary Administrator role.

2 Log into the Solaris 9 system to archive.

3 Change directories to the root directory.

```
# cd /
```

4 Use `flarcreate` to create a flash archive image file named `s9-system`, and place the archive onto the Solaris 10 system:

```
s9-system # flarcreate -S -n s9-system /net/s10system/export/s9-system.flar
Determining which filesystems will be included in the archive...
Creating the archive...
cpio: File size of "etc/mnttab" has
increased by 435
2068650 blocks
1 error(s)
Archive creation complete.
```

Tip – In some cases, `flarcreate` can display errors from `cpio`. Most commonly, these are messages such as `File size of etc/mnttab has increased by 33`. When these messages pertain to log files or files that reflect system state, they can be ignored. Be sure to review all error messages thoroughly.

Other Archive Creation Methods

You can use alternate methods for creating the archive. The installer can accept the following archive formats:

- `cpio` archives
- `gzip` compressed `cpio` archives
- `bzip2` compressed `cpio` archives
- `pax` archives created with the `-x xustar` (`XUSTAR`) format
- `ufsdump` level zero (full) backups

Additionally, the installer can accept a directory of files created by using an archiving utility that saves and restores file permissions, ownership, and links. Thus, an example of a utility that cannot be used is `tar`, because `tar` does not handle links.

For more information, see the `cpio(1)`, `pax(1)`, `bzip2`(1), `gzip`(1), and `ufsdump(1M)` man pages.

Host ID Emulation

When applications are migrated from a standalone Solaris 9 system into a `solaris9` zone on a new system, the `hostid` changes to be the `hostid` of the new machine.

In some cases, applications depend on the original `hostid`, and it is not possible to update the application configuration. In these cases, the `solaris9` zone can be configured to use the `hostid` of the original system. This is done by setting a `zonecfg` attribute to specify the `hostid`, as shown in "How to Configure a `solaris9` Branded Zone" on page 27. The value used should be the output of the `hostid` command as run on the original system. To view the `hostid` in an installed zone, also use the `hostid` command.

For more information, see `hostid(1)`.

Setting the Machine Name to sun4u

A zonecfg attribute can be used to specify the machine name returned by uname as sun4u, even if the underlying Solaris 10 system is running on an sun4v machine. The setting is shown in "How to Configure a solaris9 Branded Zone" on page 27.

◆ ◆ ◆ CHAPTER 4

Configuring a Solaris9 Zone

This chapter discusses configuring the Solaris9 branded zone.

Preconfiguration Tasks

You will need the following:

- A SPARC based system running Solaris 10 8/07 or later update release. All SPARC systems capable of running Solaris 10 are supported.
- For zones that require network connectivity, you will need to provide the following information when you create the zone configuration.
  - For a shared-IP zone, you will need one or more unique IPv4 addresses for each zone you want to create. You must also specify the physical interface.
  - For an exclusive-IP zone, you must set the ip-type property to exclusive. You must also assign a data-link using the physical property of the net resource. The zone requires exclusive access to one or more network interfaces. The interface could be a separate LAN such as bge1, or a separate VLAN such as bge2000. The data-link must be of the GLDv3 type. For more information on GLDv3 interfaces, see "Solaris OS Interface Types" in *System Administration Guide: IP Services*. Note that the address property of the net resource is not set in an exclusive-IP zone.

  Note – Exclusive-IP zones are a new feature in the Solaris 10 8/07 release. If you are not familiar with this feature, see the *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* for more information.

- (Optional) A SPARC based machine running the Solaris 9 operating system that you want to migrate into a solaris9 container. You can generate your own images from existing systems. The process is described in "Creating the Image for Directly Migrating Solaris 9 Systems Into Zones" on page 22.

A sample Solaris 9 based image that can be used to create a solaris9 container is also available. See Step 5 of "Installing the Solaris 9 Containers 1.0.1 Software on the Solaris 10 Host System" on page 18.

solaris9 Branded Zone Configuration Process

The zonecfg command is used to do the following:

- Set the brand for the zone.
- Create the configuration for the solaris9 zone. Refer to the information you gathered in "Assess the Solaris 9 System" on page 21.
- Verify the configuration to determine whether the specified resources and properties are allowed and internally consistent on a hypothetical SPARC based system.
- Perform a brand-specific verification. The verification ensures that the zone does not have any inherited package directories or ZFS datasets.

The check performed by the zonecfg verify command for a given configuration verifies the following:

- Ensures that a zone path is specified
- Ensures that all of the required properties for each resource are specified
- Ensures that brand requirements are met

For more information about the zonecfg command, see the zonecfg(1M) man page.

Resources Included in the Configuration by Default

File Systems Defined in solaris9 Branded Zones

The file systems that are required for a branded zone are defined in the brand. You can add additional Solaris file systems to a solaris9 branded zone by using the fs resource property.

Privileges Defined in solaris9 Branded Zones

Processes are restricted to a subset of privileges. Privilege restriction prevents a zone from performing operations that might affect other zones. The set of privileges limits the capabilities of privileged users within the zone.

Default, required default, optional, and prohibited privileges are defined by each brand. You can also add or remove certain privileges by using the limitpriv property. See "Privileges in a Non-Global Zone" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* for information on Solaris privileges with respect to zones.

For more information about privileges, see the ppriv(1) man page and *System Administration Guide: Security Services*.

Configure the solaris9 Zone

You must be the global administrator in the global zone to perform these procedures.

How to Configure a solaris9 Branded Zone

Use the zonecfg command to create an s9 zone.

You must be the global administrator in the global zone to perform this procedure.

The zonecfg prompt is of the following form:

```
zonecfg:zonename>
```

When you are configuring a specific resource type, such as a file system, that resource type is also included in the prompt:

```
zonecfg:zonename:fs>
```

Note – Resource controls are set to the Solaris 9 defaults. Review these settings to see whether they should be adjusted.

Tip – If you know you will be using CDs or DVDs to install applications in a solaris9 branded zone, use add fs to add read-only access to CD or DVD media in the global zone when you initially configure the branded zone. A CD or DVD can then be used to install a product in the branded zone. See "How to Add Access to CD or DVD Media in a Non-Global Zone" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* for more information.

This procedure describes configuring a shared-IP zone. To configure an exclusive-IP zone, see "Resource Type Properties" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

1. **Become superuser, or assume the Primary Administrator role.**

2. **Set up a shared-IP zone configuration with the zone name you have chosen.**

   The name s9-zone is used in this example procedure.

   ```
   global# zonecfg -z s9-zone
   ```

If this is the first time you have configured this zone, you will see the following system message:

```
s9-zone: No such zone configured
Use 'create' to begin configuring a new zone.
```

3 Create the new solaris9 zone configuration by using the SUNWsolaris9 template.

```
zonecfg:s9-zone> create -t SUNWsolaris9
```

4 Set the zone path, /export/home/s9-zone in this procedure.

```
zonecfg:s9-zone> set zonepath=/export/home/s9-zone
```

5 Set the autoboot value.

If set to true, the zone is automatically booted when the global zone is booted. Note that for the zones to autoboot, the zones service svc:/system/zones:default must also be enabled. The default value is false.

```
zonecfg:s9-zone> set autoboot=true
```

6 Add a network virtual interface.

```
zonecfg:s9-zone> add net
```

a. Set the IP address. In this procedure, *10.6.10.233* is used.

```
zonecfg:s9-zone:net> set address=10.6.10.233
```

b. Set the physical device type for the network interface, the bge device in this procedure.

```
zonecfg:s9-zone:net> set physical=bge0
```

c. End the specification.

```
zonecfg:s9-zone:net> end
```

This step can be performed more than once to add more than one network interface.

7 Add a ZFS file system shared with the global zone.

```
zonecfg:s9-zone> add fs
```

a. Set the type to zfs.

```
zonecfg:s9-zone:fs> set type=zfs
```

b. Set the directory to mount from the global zone.

```
zonecfg:s9-zone:fs> set special=share/zone/s9-zone
```

c. Specify the mount point.

```
zonecfg:s9-zone:fs> set dir=/export/shared
```

d. End the specification.

```
zonecfg:s9-zone:fs> end
```

This step can be performed more than once to add more than one file system.

8 (Optional) Set the `hostid` to be the `hostid` of the source system.

```
zonecfg:s9-zone> add attr
```

a. Set the attribute name to `hostid`.

```
zonecfg:s9-zone:attr> set name=hostid
```

b. Set the `type` to `string`.

```
zonecfg:s9-zone:attr> set type=string
```

c. Set the `value` to the `hostid`.

```
zonecfg:s9-zone:attr> set value=8325f14d
```

d. End the specification.

```
zonecfg:s9-zone:attr> end
```

9 (Optional) Set the machine name returned by `uname` to always be `sun4u`.

```
zonecfg:s9-zone> add attr
```

a. Set the attribute name to `machine`.

```
zonecfg:s9-zone:attr> set name=machine
```

b. Set the `type` to `string`.

```
zonecfg:s9-zone:attr> set type=string
```

c. Set the `value` to `sun4u`.

```
zonecfg:s9-zone:attr> set value=sun4u
```

d. End the specification.

```
zonecfg:s9-zone:attr> end
```

10 Verify the zone configuration for the zone.

```
zonecfg:s9-zone> verify
```

11 Commit the zone configuration for the zone.

```
zonecfg:s9-zone> commit
```

12 Exit the `zonecfg` command.

```
zonecfg:s9-zone> exit
```

Note that even if you did not explicitly type `commit` at the prompt, a `commit` is automatically attempted when you type `exit` or an EOF occurs.

13 Use the `info` subcommand to check that the brand is set to `solaris9`.

```
global# zonecfg -z s9-zone info
```

14 (Optional) Use the `info` subcommand to check the `hostid`:

```
global# zonecfg -z s9-zone info attr
```

Next Steps

Tip – After you have configured the branded zone, it is a good idea to make a copy of the zone's configuration. You can use this backup to restore the zone in the future. As superuser or Primary Administrator, print the configuration for the zone `s9-zone` to a file. This example uses a file named `s9-zone.config`.

```
global# zonecfg -z s9-zone export > s9-zone.config
```

See Also For additional components that can be configured using `zonecfg`, see *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*. The guide also provides information on using the `zonecfg` command in either command-line or command-file mode. For more information about adding ZFS file systems, see "Adding ZFS File Systems to a Non-Global Zone" in *Solaris ZFS Administration Guide*

◆ ◆ ◆ CHAPTER 5

Installing the `solaris9` Zone

This chapter covers installing a `solaris9` branded zone.

The `zoneadm` Command

The `zoneadm` command described in the `zoneadm`(1M) man page is the primary tool used to install and administer non-global zones. Operations using the `zoneadm` command must be run from the global zone. The following tasks can be performed using the `zoneadm` command:

- Verify a zone
- Install a zone
- Boot a zone
- Display information about a running zone
- Halt a zone
- Reboot a zone
- Uninstall a zone
- Relocate a zone from one point on a system to another point on the same system
- Provision a new zone based on the configuration of an existing zone on the same system
- Migrate a zone, used with the `zonecfg` command

Migration Process

In addition to unpacking files from the Solaris 9 archive, the install process performs checks, required postprocessing, and other functions to ensure that the zone is optimized to run on the host. If you are migrating a zone to a new host, see "Zone Migration and Initial Boot" on page 36.

solaris9 Zone Installation Images

Types of Images

- You can use an image of a Solaris 9 system that has been fully configured with all of the software that will be run in the zone. See "Creating the Image for Directly Migrating Solaris 9 Systems Into Zones" on page 22.
- You can use an image provided by Sun to create and install the solaris9 branded zone.

Image sysidcfg Status

The sample Solaris 9 image provided by Sun has been processed using the sys-unconfig command described in sys-unconfig(1M). That is, it does not have a hostname or name service configured, which is also known as "as-manufactured." See "How to Log In to the Zone Console to Complete System Identification" on page 37.

If you created a Solaris 9 system archive from an existing system and use the -p (preserve sysidcfg) option when you install the zone, then the zone will have the same identity as the system used to create the image.

If you use the -u (sys-unconfig) option when you install the target zone, the zone produced will not have a hostname or name service configured.

Caution – You *must* use either the -p option or the -u option. If you do not specify one of these two options, an error results.

▼ How to Install the Zone

You must be the global administrator in the global zone to perform this procedure.

Note – This example procedure uses the blank archive image, solaris9-image.flar. This archive is in the sys-unconfig state. See "Software Download" on page 17 to obtain this file.

For information on creating images of Solaris 9 systems, see "Creating the Image for Directly Migrating Solaris 9 Systems Into Zones" on page 22.

1 **Become superuser, or assume the Primary Administrator role.**

2 **Install the configured zone s9-zone by using the zoneadm command with the install -a option and the path to the archive.**

```
global# zoneadm -z s9-zone install -u -a /net/server/s9_image.flar
```

You will see various messages as the installation completes. This can take some time.

Note – To retain the `sysidcfg` identity from a system image that you created without altering the image, use the `-p` option after the `install` subcommand . To remove the system identity from a system image that you created without altering the image, use the `-u` option. The `sys-unconfig` occurs to the target zone.

---

3 (Optional) If an error message is displayed and the zone fails to install, type the following to get the zone state:

```
global# zoneadm list -cv

ID  NAME     STATUS       PATH                           BRAND      IP
 0  global   running      /                              native     shared
 -  s9-zone  configured   /export/home/s9-zone         solaris9     shared
```

- If the state is listed as configured, make the corrections specified in the message and try the `zoneadm install` command again.
- If the state is listed as incomplete, first execute this command:

  ```
  global# zoneadm -z my-zone uninstall
  ```

  Then make the corrections specified in the message, and try the `zoneadm install` command again.

4 When the installation completes, use the `list` subcommand with the `-i` and `-v` options to list the installed zones and verify the status.

```
global# zoneadm list -iv
```

You will see a display that is similar to the following:

```
ID  NAME     STATUS       PATH                           BRAND      IP
 0  global   running      /                              native     shared
 -  s9-zone  installed    /export/home/s9-zone         solaris9     shared
```

Example 5–1 `solaris9` Zone Installation

```
# zoneadm -z s9-zone install -a /net/machinename/s9_image.flar
      Log File: /var/tmp/s9-zone.install.21207.log
        Source: /net/machinename/s9_image.flar
    Installing: This may take several minutes...
Postprocessing: This may take a minute...

        Result: Installation completed successfully.
      Log File: /export/home/s9-zone/root/var/log/s9-zone.install.21207.log
```

More Information

Installer Options

Option	Description
`-a`	Location of archive from which to copy system image. Full flash archive and `cpio`, `gzip` compressed `cpio`, `bzip` compressed `cpio`, and level 0 `ufsdump` are supported. Refer to the `gzip` man page available in the `SUNWsfman` package.
`-d`	Location of directory from which to copy system image.
`-p`	Preserve system identity.
`-s`	Install silently.
`-u`	`sys-unconfig` the zone.
`-v`	Verbose output.

Troubleshooting

If an installation fails, review the log file. On success, the log file is in two places: `/var/tmp` in the global zone, and `/var/log` inside the zone. On failure, the log file is in `/var/tmp`.

If a zone installation is interrupted or fails, the zone is left in the incomplete state. Use `uninstall -F` to reset the zone to the configured state. See "How to Uninstall a Zone" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* for more information.

◆ ◆ ◆ CHAPTER 6

Booting a Zone and Zone Migration

This chapter describes how to boot the installed zone, and also discusses how to migrate the zone to another machine.

If you are booting a zone that does not have the hostname or name service configured, read Chapter 7, "About Zone Login and Post-Installation Configuration," first.

About Booting the Zone

Booting a zone places the zone in the running state. A zone can be booted from the ready state or from the installed state. A zone in the installed state that is booted transparently transitions through the ready state to the running state. Zone login is allowed for zones in the running state.

▼ How to Boot the Zone

You must be the global administrator in the global zone to perform this procedure.

1. **Become superuser, or assume the Primary Administrator role.**

2. **Use the `zoneadm` command with the `-z` option, the name of the zone, which is `s9-zone`, and the `boot` subcommand to boot the zone.**

   ```
   global# zoneadm -z s9-zone boot
   ```

3. **When the boot completes, use the `list` subcommand with the `-v` option to verify the status.**

   ```
   global# zoneadm list -v
   ```

You will see a display that is similar to the following:

```
ID  NAME     STATUS       PATH                           BRAND      IP
 0  global   running      /                              native     shared
 1  s9-zone  running      /export/home/s9-zone         solaris9     shared
```

See Also For more information on booting zones and boot options, see Chapter 20, "Installing, Booting, Halting, Uninstalling, and Cloning Non-Global Zones (Tasks)," in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

Migrating a solaris9 Zone to Another Host

About Detaching and Attaching the Zone

A solaris9 zone can be migrated to another host by using the zoneadm command with the detach and attach subcommands. This process is described in "About Migrating a Zone" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones* and "How to Migrate A Non-Global Zone" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

To attach the solaris9 zone to the new host, you **must** use the -F option. This option is used to skip package and patch validation, which are not needed for branded zones.

EXAMPLE 6–1 Sample attach Command

```
host2# zoneadm -z zonename attach -F
```

Zone Migration and Initial Boot

During the process of installing the solaris9 branded zone, a physical-to-virtual conversion is automatically performed. When a solaris9 branded zone is migrated to a new host, this process must be repeated to ensure that the zone is optimized to run on the new host. The first time that the zone attempts to boot on the new host it will detect whether the s9_p2v conversion command was run. The zone will not boot if the command has not been run again.

If you are booting a migrated s9-zone zone on a new host for the first time, run the following command before you boot the zone:

```
global# /usr/lib/brand/solaris9/s9_p2v zonename
```

◆ ◆ ◆ CHAPTER 7

About Zone Login and Post-Installation Configuration

This chapter discusses logging in to zones, using `sysidcfg` to complete system identification, making modifications to `/etc/system`, and using `ssh` X11 forwarding in a `solaris9` zone.

Internal Zone Configuration

Note that you perform the internal zone configuration when you log in to the `sys-unconfig` zone for the first time. This is described in "Internal Zone Configuration" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

When responding to the system question asking whether the time is correct, do not modify the time displayed. If you modify the time, the system identification will fail and return to the time setting prompt, because non-global zones cannot modify the system clock by default. You must also accept the network configuration already specified in `zonecfg` for shared-IP zones.

If you plan to use an `/etc/sysidcfg` file to perform initial zone configuration, as described in "How to Use an /etc/sysidcfg File to Perform the Initial Zone Configuration" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*, create the `sysidcfg` file and place it the zone's `/etc` directory before you boot the zone.

▼ How to Log In to the Zone Console to Complete System Identification

You must be the global administrator in the global zone to perform this procedure.

1. **Become superuser, or assume the Primary Administrator role.**

2. **Use the `zlogin` command with the `-C` option and the name of the zone, `s9-zone` in this procedure.**

```
global# zlogin -C s9-zone
```

3 From another terminal window, boot the zone.

```
global# zoneadm -z s9-zone boot
```

You will see a display similar to the following in the `zlogin` window:

```
[NOTICE: Zone booting up]
```

4 The first time you log in to the console, you are prompted to answer a series of questions. Your screen will look similar to this:

```
SunOS Release 5.9 Version Generic_Virtual 64-bit
Copyright 1983-2000 Sun Microsystems, Inc.  All rights reserved
Use is subject to license terms.

Hostname: s9-zone
Select a Language

     0. English
     1. fr
Please make a choice (0 - 1), or press h or ? for help:

Select a Locale

 0. English (C - 7-bit ASCII)
  1. Canada-English (ISO8859-1)
  2. Thai
  3. U.S.A. (en_US.ISO8859-1)
  4. U.S.A. (en_US.ISO8859-15)
  5. Go Back to Previous Screen

Please make a choice (0 - 5), or press h or ? for help:

What type of terminal are you using?
1) ANSI Standard CRT
 2) DEC VT52
 3) DEC VT100
 4) Heathkit 19
 5) Lear Siegler ADM31
 6) PC Console
 7) Sun Command Tool
 8) Sun Workstation
 9) Televideo 910
 10) Televideo 925
 11) Wyse Model 50
 12) X Terminal Emulator (xterms)
 13) Other
Type the number of your choice and press Return:
12
.
```

.
.

For the approximate list of questions you must answer, see "Internal Zone Configuration" in *System Administration Guide: Solaris Containers-Resource Management and Solaris Zones*.

5 **(Optional) If you are not using two windows as described in step 3, you might have missed the initial prompt for configuration information. If you see the following system message at zone login instead of a prompt:**

```
[connected to zone zonename console]
```

Press Return to display the prompt again.

If you enter an incorrect response and try to restart the configuration, you might experience difficulty when you attempt the process again. This occurs because the `sysidtools` can store your previous responses.

If this happens, use the following workaround from the global zone to restart the configuration process.

```
global# zlogin -S zonename /usr/sbin/sys-unconfig
```

For more information on the `sys-unconfig` command, see the `sys-unconfig(1M)` man page.

Applying Solaris 9 Patches in the Container

Solaris 9 patches can be applied to the Solaris 9 environment from within the container, using the same process as on a standalone system. Obtain the patch and, while running in the `solaris9` zone, run patchadd to install the patch. Note that because the kernel is actually a Solaris 10 kernel, patches that alter any Solaris 9 kernel bits will not take effect. In this case, the equivalent Solaris 10 patch should be applied in the global zone if needed. Even though Solaris 9 patches delivering kernel updates have no effect within the zone, they are still required to satisfy patch dependencies.

For more information on patching Solaris 9 systems, see Chapter 24 Managing Solaris Patches (Overview) in *System Administration Guide: Basic Administration*.

Tuning `/etc/system` and Using Resource Controls

In Solaris 9, System V and file descriptor limits are tuned by modifying `/etc/system` and rebooting the machine to have the modifications take effect. In Solaris 10, these limits can be tuned dynamically through resource controls.

For a `solaris9` branded zone, the contents of `/etc/system` are used to set project and process resource controls when the zone boots. If `/etc/system` is not tuned, the default file descriptor and System V limits from Solaris 9 are used.

The effective limits within the zone will be the lower of the zone's /etc/system or the zone's zonecfg settings. To view the effective limits, run the sysdef command described in the sysdef(1M) *in* the zone.

You must be the zone administrator to modify /etc/system within the solaris9 branded zone. and reboot it to have the changes take effect. Because /etc/systemcan be modified within the zone, the global administrator can use the zonecfg command from the global zone to set limits for the zone.

Use the prctl command from the global zone to view the default resource control settings. The example shows that the default settings on the init process restrict the System V limits.

EXAMPLE 7–1 View Default Settings on the init Process in a solaris9 Zone

```
global# prctl 'pgrep -x init -z s9zone'
...
process.max-msg-messages
        privileged         40       -   deny                         -
        system          4.29G     max   deny                         -
process.max-msg-qbytes
        privileged      4.00KB       -   deny                         -
        system          16.0EB     max   deny                         -
process.max-sem-ops
        privileged         10       -   deny                         -
        system          2.15G     max   deny                         -
process.max-sem-nsems
        privileged         25       -   deny                         -
        system          32.8K     max   deny                         -
process.max-file-descriptor
        basic             256       -   deny                     10485
        privileged      1.02K       -   deny                         -
        system          2.15G     max   deny                         -
...
project.max-shm-memory
        privileged       100MB       -   deny                         -
        system          16.0EB     max   deny                         -
project.max-shm-ids
        privileged        100       -   deny                         -
        system          16.8M     max   deny                         -
project.max-msg-ids
        privileged         50       -   deny                         -
        system          16.8M     max   deny                         -
project.max-sem-ids
        privileged         10       -   deny                         -
        system          16.8M     max   deny                         -
...
```

Modifying /etc/system

For applications that require these tunings to be increased, the zone administrator can modify /etc/system within the solaris9 branded zone, and reboot it. This procedure is identical to that used to increase tunings on a native Solaris 9 system.

Using zonecfg to Set Resource Controls

The zonecfg command can be used from the global zone to restrict the System V limits within the zone.

EXAMPLE 7–2 Setting Resource Controls From the Global Zone

You must be the global administrator in the global zone to perform these procedures.

```
global# zonecfg -z mys9zone set max-shm-memory=100m
```

If you use zonecfg after initial zone creation, reboot the zone to have the change take effect.

```
global# zoneadm -z mys9zone reboot
```

Running X11 Applications in a solaris9 Branded Zone

ssh X11 forwarding is the preferred method for running Solaris 9 X11 applications, including 3-D and graphics intensive applications, within a solaris9 zone. 3-D applications can only be run on a system that supports 3-D graphics in the global zone.

▼ How to Use ssh X11 Forwarding

To use X11 forwarding, you must meet the following requirements:

- Networking must be enabled for the solaris9 zone
- Because Solaris 9 does not include the ssh login by default, ssh must be downloaded and installed in the zone.

1. **Become superuser, or assume the Primary Administrator role.**
2. **Enable networking in the zone as described in "How to Configure a solaris9 Branded Zone" on page 27.**
3. **Download ssh from www.openssh.org (http://www.openssh.org), www.sunfreeware.com (http://www.sunfreeware.com) or www.blastwave.com (http://www.blastwave.com) and install it in the zone.**

4. **When `ssh` is running in the zone, log directly into the X server running on the console of the global zone.**

5. **To enable `ssh` X11 forwarding and run X applications remotely, use the following command:**

```
# ssh -X zone_host_name
```

Troubleshooting Any application that delivers its own Xserver extensions will not work with `ssh -X` forwarding and is not currently supported within `solaris9` branded zones.

◆ ◆ ◆ APPENDIX A

solaris9(5) Man Page

NAME

solaris9—Solaris 9 container

Description

The solaris9 container uses the branded zones framework described in brands(5)to enable Solaris 9 binary applications to run unmodified on a machine with the latest Solaris Operating System kernel.

The solaris9 brand includes the tools necessary to install a Solaris 9 system image into a non-global zone. The brand supports the execution of 32-bit and 64-bit Solaris 9 applications on SPARC machines running the latest Solaris operating system.

Configuration and Administration

The solaris9 brand supports the whole root non-global zone model. All of the required Solaris 9 software and any additional packages are installed into the private file systems of the zone.

The zonecfg(1M) utility is used to configure a solaris9 branded zone. Once a branded zone has been installed, that zone's brand cannot be changed or removed. The zoneadm(1M) utility is used to report the zone's brand type and administer the zone. The zlogin(1) utility is used to log in to the zone.

The solaris9 brand installer supports installing the zone from an image of an installed Solaris 9 system. This can be a full flash_archive(4), cpio(1) archive optionally compressed with gzip(1) or bzip2(1), or pax(1) xustar archive. The image can also be a level 0 ufsdump(1M), or a path to the top-level of a Solaris 9 system's root directory tree. The zone cannot be installed from standard Solaris 9 distribution media. The zoneadm(1M) brand-specific subcommands accept the following arguments:

install [`-a` *archive*] [`-d` *path*] [`-s`] [`-u`] [`-v`]	Install the specified Solaris 9 system image into the zone. Either the `-u` or `-p` option is required and either the `-a` or `-d` option is required.
`-a` *archive*	The path to a `flash_archive(4)`, `ufsdump(1M)`, or `pax(1)` `xustar` archive of an installed Solaris 9 system. The `cpio` archives may be compressed using the `gzip`(1) or the `bzip`(1) commands.
`-d` *path*	The path to the root directory of an installed Solaris 9 system.
`-p`	Preserve the system configuration after installing the zone.
`-s`	Install silently.
`-u`	Run `sys-unconfig(1M)` on the zone after installing it.
`-v`	Verbose output from the install process.

Application Support

The `solaris9` zone only supports user-level Solaris 9 applications. You cannot use Solaris 9 device drivers, Solaris 9 kernel modules, or Solaris 10 only file systems, such as `zfs(1M)` delegated datasets,, from inside a `solaris9` zone. However, you can add `fs` resources in `zonecfg` with `type=zfs`.

Native Solaris debugging tools such as DTrace (see `dtrace(1M)`) can be applied to Solaris 9 processes executing inside the zone, but the tools themselves must be running in the global zone.

Zone Migration

During the process of installing the zone a "physical to virtual" conversion is automatically performed. After a `solaris9` branded zone is migrated to a new host, this process should be repeated to ensure that the zone is optimized to run on the new host. The first time that the zone attempts to boot on the new host it will detect this situation and the zone will not boot until the following command is run:

```
/usr/lib/brand/solaris9/s9_p2v zonename
```

Attributes

See attributes(5) for a description of the following attributes:

ATTRIBUTE TYPE	ATTRIBUTE VALUE
Availability	SUNWs9brandr, SUNWs9brandu
Interface Stability	Evolving

See Also

pax(1), zlogin(1), zonename(1), dtrace(1M), flarcreate(1M), ufsdump(1M), zfs(1M), zoneadm(1M), zonecfg(1M), flash_archive(4), brands(5), zones(5)

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