
Diskless Workstation Administration Guide Addendum

This supplement updates the information in the *Diskless Workstation Administration Guide*. It explains how to implement a diskless configuration using IRIX™ 6.4 on the server and IRIX 6.2, 6.3, or 6.4 on the share tree and client trees. Use the *Diskless Guide* along with this supplement to set up these server-client configurations:

- Servers

Origin2000™, Onyx2™, or OCTANE™ models running IRIX 6.4. A disk drive on the server contains a filesystem (or portion of a filesystem) that supports one or more clients.

- Clients

IndigoII™ R10000 models running IRIX 6.2, O2™ models running IRIX 6.3, or OCTANE models running IRIX 6.4. Each client accesses IRIX and other software that it needs from designated directories on the server.

Note: You can use this supplement with configurations other than those listed above, but you might need to make adjustments for your configuration that are not documented in this supplement.

The IRIX version running on the server cannot be earlier than the version of IRIX running on the client. For example, a server running IRIX 6.4 can support IRIX 6.2, IRIX 6.3, and IRIX 6.4 clients; but a server running IRIX 6.3 is able to support only IRIX 6.2 and 6.3 clients.

Introduction

A diskless server contains a hierarchy of directories to support its clients. This hierarchy, usually a dedicated filesystem, contains these components:

- Share tree
A directory on the server containing IRIX, IRIX utilities, and other files that are shared by clients running the same IRIX version. A server that supports multiple versions of IRIX contains multiple share trees.
- Client trees
A directory on the server containing the IRIX kernel, hardware-specific files, and private files (such as */etc/hosts* and */etc/sys_id*) for a single client. A server contains one client tree for each client that it supports.
- Swap trees
One or more directories containing a swap file for a particular client. Swap files are used for virtual memory operations. A server contains one swap tree for each client.

Starting a Diskless Installation With This Supplement

Read the *Diskless Workstation Administration Guide* before starting an installation, particularly if you are not experienced with installing or maintaining diskless configurations. Plan to use both the *Diskless Guide* and these supplementary instructions during the installation procedure.

Checking a Server: Supplementary Instructions

The questions below duplicate some of the questions listed in Chapter 2 of the *Diskless Guide* under the heading "Checking a Server." Use the information below to help you answer those questions during the server check-out process.

Does the server have ample disk space?

On average, approximately 960 megabytes (MB) of disk space is required for a diskless implementation with these characteristics:

- One share tree of IRIX 6.4 with a default software configuration.
- One client tree with a default software configuration.
- One swap tree containing 64MB of swap space.

The disk space used for the diskless tree is greatly influenced by the number of client trees and the particular software that they contain. To estimate this disk usage, use the *du* command on an individual client tree and multiply the results by the number of clients that you plan to support (see the *du* manual page for details).

Is the server running the necessary software?

The base 6.4 NFS images—at minimum the *eo.e.sw.unix*, *nfs.sw.dskless*, *nfs.sw.nis* images—must be installed before you begin these instructions.

Using patchSG0002006 or its successor, install the subsystems listed below on the server. Notice how the name of a patch corresponds to the name of the subsystem that it replaces:

- patchSG0002006eo.e_sw.unix
- patchSG0002006nfs_sw.dskless_server
- patchSG0002006nfs_sw.nis

After you install the *eo.e_sw.unix* portion of patch patchSG0001868, autoconfigure and reboot the server to enable the code from the NFS patch.

Note: You must also install the *eo.e_sw.unix* portion of this patch on both the share tree and the client tree.

Checking a Client: Supplementary Instructions

The questions below duplicate some of the questions listed in Chapter 2 of the *Diskless Guide* under the heading "Checking a Client." Use the information below to help you answer those questions during the client check-out process.

What hardware components does the client contain?

The following table supplements the information in Table 2-2, "Workstation Hardware Components" with information for new workstation models:

Table 1 Components List for New Hardware Models

Model Name	CPU Processor	CPU Board	Graphics Subsystem	Graphics Subgroup
Indigo2 10000 IMPACT	R10000	IP28	MGRAS	I2_64
Indigo2 10000 Extreme	R10000	IP28	EXPRESS	I2_64
Indigo2 10000 XZ	R10000	IP28	EXPRESS	I2_64
OCTANE SI	R10000	IP30	MGRAS	RACER
OCTANE SSI	R10000	IP30	MGRAS	RACER
OCTANE MXI	R10000	IP30	MGRAS	RACER
O2	R10000	IP32	CRIME	CRM
O2	R5000	IP32	CRIME	CRM

In addition to the table data above, the MODE variable, which specifies either 32- or 64-bit IRIX, must be set in the edited version of the *share.dat* and *client.dat* files. For IRIX 6.2 and 6.3 clients, MODE is always set to 32. For IRIX 6.4 clients, see the information given in Table 3 for MODE settings.

Planning Share Trees: Supplementary Instructions

The information in this section supplements Figure 2-2 and Table 2-4, which appear in Chapter 2 in the *Diskless Guide* under the heading "Planning Share Trees." Directories shown in Figure 2-2, "Typical Share Tree Contents," should include the directory */lib32*. The Figure 2-2 list should read */usr, /sbin, /lib, /lib32, and /stand*.

The following table lists recommended software for a basic share tree.

Table 2 Products to Install on the Share Tree

Software Product	Subsystem Installed
IRIX EOE (eoe)	All default selections
Desktop base (desktop_base)	All default selections
Compiler EOE (compiler_eoe)	All default selections
Motif EOE (motif_eoe)	All default selections
X Window System (x_eoe)	All default selections
NFS (nfs)	nfs.sw.nfs nfs.sw.nfs nfs.sw.dskless_client
Default Window Manager (4Dwm)	All default selections
Desktop EOE (desktop_eoe)	All default selections

Planning Swap Trees: Supplementary Instructions

The default swap space size suggested in "Planning Swap Trees" in Chapter 2 of the *Diskless Guide* has increased from 20Mb to 64Mb. To change the default size of the swap file, edit the SWAPSIZE variable in the working *client.dat* file before running the *client_inst* utility.

Overview of the Installation Procedure: Supplementary Instructions

The basic steps of the procedure described in "Overview of the Installation Procedures" in Chapter 2 of the *Diskless Guide* remain the same. However, for IRIX 6.2 and later, the procedure requires steps 3 and 6 below, which install necessary patches.

1. Edit a working copy of *share.dat* to describe the server setup for each client class that the server is to support.
2. Run *share_inst* to install the share tree.

3. Before quitting `Inst`, install the patch image or images.
4. Edit a working copy of `client.dat` to describe the client tree for each class of workstations.
5. For each client, run `client_inst` to install its client and swap tree.
6. Before quitting `Inst`, install the patch image or images.
7. Boot each client and verify the installation.

Editing the Share Tree File: Supplementary Instructions

Two subsections in "Editing the Share Tree File" in Chapter 3 of the *Diskless Guide* require updated information: "Setting Share Tree Variables" and "Setting Client Hardware Variables."

Supplementary Instructions for Setting Share Tree Variables

The `share.dat` file, described in the subsection "Setting Share Tree Variables," contains an obsolete variable, `MACH`. It is no longer necessary to specify a value for this variable.

The `share.dat` file now contains a new variable, `MODE`. `MODE` variable specifies the IRIX variant (32-bit or 64-bit) for the share tree. `MODE` must be set to "64bit" for OCTANE and Indigo2 R10000 systems in `share.dat` and `client.dat` before you start the `share_inst` and `client_inst` utilities. The default setting for `MODE`, null, is valid for all other system models.

Note: If you fail to set the `MODE` variable for models that require it, the share and client trees will not be configured correctly and the client kernel will not boot properly.

Supplementary Instructions for Setting Client Hardware Variables

Hardware variable descriptions in the subsection titled "Setting Client Hardware Variables" in the *Diskless Guide* do not include settings for new system models. The hardware settings for new client models are given below:

- MODE

Set the new MODE variable on these models (accept the default for all other models):

Table 3 MODE Variable Settings for New Client Models

Machine type	MODE
O2	32bit
OCTANE	64bit
Indigo2 R10000	64bit

- CPUBOARD

Use these CPUBOARD variables for the following models:

Table 4 CPU Variable Settings for New Client Models

Machine type	CPUBOARD
O2	IP32
OCTANE	IP30
Indigo2 R10000	IP28

- CPUARCH

Use these CPUARCH variables for the following models:

Table 5 CPUARCH Variable Settings for New Client Models

Machine type	CPUARCH
O2	R10000
O2	R5000
OCTANE	R10000
Indigo2 R10000	R10000

- GFXBOARD

Use these GFXBOARD variables for the following models:

Table 6 GFXBOARD Variable Settings for New Client Models

Machine type	GFXBOARD
O2	CRIME
OCTANE	MGRAS
Indigo2 R10000	MGRAS
Indigo2 R10000	EXPRESS

- MACH

(No longer in use.)

Share Tree Installation Procedure: Supplementary Instructions

The "Share Tree Installation Procedure" in Chapter 3 of the *Diskless Guide* contains step-by-step instructions for installing a share tree. Follow the procedure in the *Diskless Guide* until you complete step 8; then follow the instructions that accompanied the patch set, such as a README file, to install the required patches.

Note: All references to “eoe1” or “eoe2” in this procedure should be “eoe” for IRIX 6.2 and later.

For example, if the share tree is to contain IRIX 6.4, complete these instructions after completing step 8 of the original procedure:

- Insert the patch CDs.
- Install the following patches or their successor patches:

Table 7 Patches Required for IRIX 6.4 Share Trees

Patch or its successor	Product
patchSG0002006	nfs & eoe
patchSG0001868	eoe (xfs)
patchSG0001856	eoe (kernel rollup)

PatchSG0001868 or its successor should be installed even if you are not planning to use any XFS features. If this patch is not installed, the client kernel will fail to build when the *client_inst* script exits.

Note: Any subsystem, required or optional, that you plan to install in the client trees must also be installed in the share tree. If you fail to install these subsystems (such as *nfs.sw.dskless_client*) in the share tree, *Inst* will not permit you to install it in the client tree.

Editing the Client Tree File: Supplementary Information

The recommended default swap size listed in the subsection “Setting Client and Swap Tree Variables” in Chapter 4 of the *Diskless Guide*, 20MB, is inadequate. The new recommended default swap sides is increased to 64MB. To increase the default swap size, reset the SWAPSIZE variable setting before you install client software with *client_inst* to ensure that the swap space is set correctly.

The “Client and Swap Tree Installation Procedure” in Chapter 4 contains step-by-step instructions for installing a client and swap tree. Follow the procedure in the *Diskless Guide* until you reach step 6; then follow the instructions that accompanied the patch set, such as a README file, to install the required patches.

For example, if the clients are to run IRIX 6.4, complete these instructions after completing step 6:

- Insert the patch CDs.
- Install the following patches or their successors:

Table 8 Patches Required for IRIX 6.4 Client Trees

Patch or its successor	Product
patchSG0002006	nfs & eoe
patchSG0001868	eoe (xfs)
patchSG0001856	eoe (kernel rollup)

Install patchSG0001868 or its successor even if you do not plan to use any XFS features. If this patch is not installed, the client kernel will fail to build when the *client_inst* script exits.

Special Instructions for All Share Trees

Remember to install *nfs.sw.dskless_client* from the base set of images in the share tree. When you boot a client system, you might see several error messages. Two errors are easily corrected:

```
"/etc/rc2.d/S75cron[58]: /sbin/cron: cannot execute"
"Removable media daemon: mediad/etc/rc2.d/S97mediad[38]:
/usr/etc/mediad: cannot execute"
```

These errors occur because the execute bit for the binaries is not set for group and other. Reset the permissions on these binary files to correct this error (see `chmod(1)` for more details).

Special Instructions for IRIX 6.4 Share Trees

Do not select patchSG0001815 for installation. Use patchSG0001856 or its successor, which includes patchSG0001815 fixes in addition to other kernel fixes.

In addition to the base images (listed in Table 2-1) and base images patch or patches, install the following patch or patches or their successors:

- patchSG0001856.eoe_sw.unix
- patchSG0001868.eoe_sw.unix
- patchSG0002006.eoe_sw.unix

Special Instructions for IRIX 6.3 Share Trees

In addition to the base images (listed in Table 2-1), install the following patches or their successors:

- patchSG0001778.eoe_sw.unix
- patchSG0001881.eoe_sw.unix
- patchSG0001881.nfs_sw.dskless_client

An error message appears on the first boot of the client:

```
"MAKEDEV.d/DKS_base[25]: egrep: not found"
```

Correct this error after you boot the client by logging in to the client as root and running the `/dev/MAKEDEV` script:

```
"/dev/MAKEDEV dks"
```

Running this command reruns MAKEDEV, creating the necessary block or character devices that were not built during the initial boot.

Sometimes an AppleTalk® message appears when the client system boots:

```
"UX:sh (S97atalk): ERROR: /usr/etc/appletalk/atalkml: Cannot execute"
```

This error occurs if the execute bit on the binary file is not set for group and other. To correct the error, reset the permission on this binary file (see `chmod(1)` for more details).

Special Instructions for IRIX 6.2 Share Trees

If you installed the xpg4 images in the share tree, you must take actions to prevent the error messages that appear the first time you boot a 6.2 client. These error messages—

mknod failures and syntax errors—appear after the "Making client's devices..." message. (The messages do not appear after the initial client boot.)

To prevent this error, replace the 6.2 version of sed with the 6.4 version of sed from the server system before you boot the client for the first time. To do this, locate the 6.2 share tree directory that is specified by the \$SHARE variable (this variable is set in the */var/boot/*.dat* files and is normally set to *\$DISKLESS/share/\$RELEASE*). For example, if \$SHARE is located in */d2/diskless/share/IRIX_62*, replace the "sed" in */d2/diskless/share/IRIX_62* with the "sed" from the server (assuming the server is running IRIX 6.4 or later.)

In addition to the mknod failures and syntax errors, another error message appears on the first boot of the client system:

```
"MAKEDEV.d/DKS_base[25]: egrep: not found"
```

Correct this problem after you boot the client by logging in to the client as root and running the */dev/MAKEDEV* script:

```
" /dev/MAKEDEV dks "
```

Running this command reruns MAKEDEV and creates the necessary block or character devices, which were not built during the initial boot.

Special Instructions for All Client Trees

Remember to select *nfs.sw.dskless_client* for installation in the client tree. In addition, follow the special instructions that are contained in the subsections below.

Special Instructions for IRIX 6.4 Client Trees

In addition to the base images and base image patches, install the following patches or their successors in IRIX 6.4 client trees:

- *patchSG0001856.eoe_sw.unix*
- *patchSG0001868.eoe_sw.unix*
- *patchSG0002006.eoe_sw.unix*

This error message appears when you shut down the system:

```
"Can't cd to /dev/scsi: No such file or directory"
```

To correct this problem, create a directory named *scsi* in the */dev* directory that is specified by the *\$CLROOT* variable. This variable is set in */var/boot/*.dat* files, and normally it points to *\$DISKLESS/client/\$HOST*. For example, if *\$CLROOT* is set to */d2/diskless/client/halebop*, use the *mkdir* command to create a directory called *scsi* in */d2/diskless/client/halebop/dev* (see *mkdir(1)*).

Special Instructions for IRIX 6.3 Client Trees

In addition to the base images, the following patches or their successors should be installed in 6.3 client trees:

- patchSG0001778.eoe_sw.unix
- patchSG0001881.eoe_sw.unix
- patchSG0001881.nfs_sw.dskless_client

Some device special files are not created correctly on a 6.3 client tree: */dev/mvp*, */dev/vice*, */dev/vicedm*, and */dev/vicedbg*. These devices implement video and voice capabilities on the client and must be created manually in the client tree using the *mknod* command (see *mknod(1M)*).

You can determine the location of */dev* in a client tree by determining the directory specified by the *\$CLROOT* variable. This variable is set in the */var/boot/*.dat* files, and normally it points to *\$DISKLESS/share/\$HOST*. For example, if *\$CLROOT* is set to */d2/diskless/client/saturn*, run *mknod* in */d2/diskless/client/saturn/dev*.

```
"mknod vice c 17 0"  
"mknod vicedms c 17 32"  
"mknod vicedbg c 17 15"  
"mknod mvp c 9 0"
```

If you installed the *appletalk.sw.pacer_base* image, you might see the following error message:

```
"snetd: failed to open driver "/dev/ec0" (Bad file number [9])"
```

If you see this message, manually create the device special file */dev/ec0* in the client tree (see *mknod(1M)*).

In the client tree, the *dev* directory is specified by the `$CLROOT` variable. This variable is set in the `/var/boot/*.dat` file and is normally `$DISKLESS/share/$HOST`. For example, if `$CLROOT` is set to `/d2/diskless/client/saturn`, run the `mknod` command in `/d2/diskless/client/saturn/dev` (see `mknod(1M)`).

```
"mknod ec0 c 117 1"
```

Special Instructions for IRIX 6.2 Client Trees

An unusual message might appear when you boot a 6.2 client:

```
"-n IP Address Configuration:"
```

This message means that the Proclaim, the client process of the Dynamic Host Configuration Protocol (DHCP) was started on the client (see `proclaim(1M)`). This is simply a notification and requires no action.

When you install 6.2 images in the share or client tree (or both) on an IRIX 6.4 server, the installation history files are written by an IRIX 6.4 version of `inst`. These installation history files are incompatible with the 6.2 version of `inst`; so, when you run the `versions` command from the 6.2 diskless client, warning messages are displayed:

```
"Use newer version of the installation tool to read this product"
```

However, the newer version of `inst` is not necessary, because it is possible to view the installation history with IRIX 6.4 on the server (see `versions(1M)`). These warning messages may also appear when you install the `mmail` product.

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