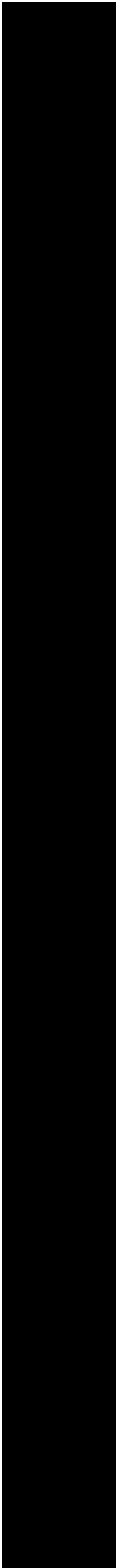


LUN*Works* for Solaris Version 1.0

Installation Manual





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Installation Manual

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Summary of Changes

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Preface

The LUNWorks for Solaris Installation Manual contains instructions to install, use, and troubleshoot StorageTek's LUNWorks application on Solaris servers that attach to a storage area network (SAN).

This manual is a supplement to the LUNWorks *Installation and User's Manual* and is intended for administrators responsible for the installation of the software and use of the application.

Because LUNWorks is transparent to non-administrative users on the network, client User Guide's are not required.

■ Organization

This manual has the following organization:

- Chapter 1** Describes how to install LUNWorks on servers using the Solaris operating systems
- Chapter 2** Describes the storage management functions
- Chapter 3** Describe two LUNWorks utilities for Solaris operating systems
- Appendix A** Provides troubleshooting tips for LUNWorks on Solaris operating systems
- Index** Assists in locating information in this publication

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■ Assumptions

This guide assumes that you have a working knowledge of Solaris Operating Systems and its conventions. Refer to your Solaris documentation for more information about commands and conventions.

This guide also assumes you are familiar with networking components and issues as they relate to the customer's environment.

■ Conventions

This guide uses the following conventions:

Note: Provides additional information that might be of special interest. A note can point out exceptions to rules or procedures. A note usually, but not always, follows the information to which it relates.

CAUTION:

Inform the user of conditions that might result in damage to hardware, corruption of customer data or application software. A caution always precedes the information to which it relates.

Command entries appear in **bold**, such as **ls /dev/rdisk/c1***.

Filenames appear in Courier font, such as `/kernel/drv`.

Keyboard keys appear in [Helvetica] font, such as [Return].

■ Related Publications

Refer to the following publications for additional information about LUNWorks:

Title	Part #
LUNWorks Installation and User's Manual	313410501
Installation Instructions	313425101
LUNWorks Read Me First file	313410602
Solaris Read Me First file	313433001
Solaris Installation Instructions	313433101
Requesting Help From Software Support	112124004

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Installation

1

This chapter describes how to install *LUNWorks* on servers using Solaris operating systems. *LUNWorks* is a software product that allows you to manage Fibre Channel storage in a highly efficient manner as an administrative cluster

■ System Requirements

All Solaris nodes must meet the following system requirements:

- Workstations or Servers running Solaris 2.6 and 7
 - Note:** *LUNWorks* operates with Solaris 7 in 32-bit mode only. Solaris 7 in 64-bit mode is not supported.
- PCI bus-equipped computer, with one free bus mastering slot
- Any UltraSPARC workstation or server
- 64 MB of RAM
- Available disk space per file system: root (/): 500k and /opt: 500k
- Network adapter
- Network protocol: TCP/IP

Note: A Windows NT 4.0 computer is required with *LUNWorks* installed and configured on the same network as the Solaris node. This system controls the function of the *LUNWorks* application.

■ Packages

The *LUNWorks* installer includes the following packages:

Table 1-1. Packages

Package	Description
TRSANfcd	<i>LUNWorks</i> software with the QLogic host bus adapter
TRSANfcdj	<i>LUNWorks</i> software with the JNI host bus adapter
TRSANdoc	Adobe Acrobat PDF versions of the <i>LUNWorks</i> documentation
Note: You must have Adobe Acrobat Reader to view the documentation. Adobe Acrobat is available on the CD-ROM.	

■ Components

The components for *LUNWorks* includes:

Table 1-2. Components

File Name	Description
sd_fcst	Fibre Channel SCSI Target drivers with support
jnic	JNI host bus adapter driver
tfc	QLogic host bus adapter driver
TRSANManService	LUNWorks Service
S99TRService	Starts LUNWorks Service at boot time

Notes: The following notes apply to the default installation locations:

1. The LUNWorks application, service, and utilities are installed into the `/opt/TRSANfcd/bin` directory unless you choose a custom location.
2. The default install location for the documentation is `/opt/TRSANfcd/doc`.
3. The drivers are installed into the `/kernel/drv` directory.
4. The `S99TRService` is copied to the `/etc/rc2.d` directory.

■ Solaris 7 Stations Only

If you are installing LUNWorks on a node that is running Solaris 7, read the following information about the QLogic HBA driver. Otherwise, continue with the HBA installation section on [“Installing the Host Bus Adapters” on page 1-3](#).

OEM Host Bus Adapter Drivers

Solaris 7 is packaged with an OEM software package that includes a QLogic HBA driver.

If the OEM software package is installed, you must remove the OEM QLogic driver before installing LUNWorks. See [“Removing the OEM Host Bus Adapter Driver” on page 1-3](#).

If you connect a Solaris machine to the Fibre Channel network while running the OEM QLogic driver, all of the devices on the SAN will be added to `/dev/rdisk` and `/dev/dsk`.

This can cause confusion, because when you run LUNWorks with its QLogic driver, only assigned devices are listed in `/dev/rdisk` and `/dev/dsk`.

Removing the OEM Host Bus Adapter Driver

To check for the OEM QLogic host bus adapter driver, look for a file named **ifp** in the `/kernel/drv` directory.

To remove the OEM QLogic host bus adapter:

1. Log in as superuser.
2. Enter **rem_drv ifp** to remove the QLogic driver.
3. Continue with the HBA installation procedure.

Note: If you decide to remove this node from the SAN at a later time, enter **add_drv -m" 0666 root root" -i"pci1077,2100" ifp** to restore the Solaris 7 QLogic driver.

■ Installing the Host Bus Adapters

To install a Fibre Channel host bus adapter (HBA) for each computer:

1. Verify that the computer functions properly before installing the HBA.
2. Power-off the computer.
3. Install the HBA. For instructions, see your HBA installation guide.
4. Cable each computer to the hub or switch.
5. Power -on the computer.

CAUTION:

For Solaris 7 nodes, remember to start up the computer in 32-bit mode.

LUNWorks cannot be installed on a node that is running Solaris 7 in 64-bit mode.

To start up in 32-bit mode:

1. Enter: **stop a** to halt the boot process.
2. Enter: **boot kernel/unix -r .**

■ Pre-Installation Checklist

The following are pre-installation checks and questions to help ensure a smooth installation of LUNWorks:

1. Does the computer meet the operating system requirements?
2. Are the HBAs installed?
3. Is the computer attached to the storage area network?
4. Is the LAN running and configured so it supports the IP addressing scheme?
 - Is the IP address on the Solaris node compatible with the IP addressing scheme on the Windows NT nodes?
 - Is the Hosts file on the Windows NT administration node updated with the Sun node's IP address? (Note: This is only necessary if Samba is not installed on the Sun node or DNS Services is not configured.)
 - Is the `/etc/hosts` file on the Sun node updated with the correct IP address that supports the LAN IP addressing setup?
5. Is LUNWorks installed and configured on at least one Windows NT node (preferably a Windows NT primary domain controller) on the SAN?
6. Is LUNWorks licensed for Sun Solaris nodes?

Run LUNWorks on a Windows NT node to check your licensing information. See the *LUNWorks Installation and User's Manual* for more information about licensing.

7. Is the Fibre Channel network hardware (such as the hubs and switches) powered on?
8. Are the network optical and copper Fibre Channel cables properly connected to the HBAs, hubs, switches, and storage disk array enclosures?

Before Beginning the Installation

Have the following items available before beginning the installation:

- LUNWorks installation CD-ROM
- *LUNWorks for Solaris Installation Manual*
- Solaris Read Me First file
- *LUNWorks Installation and User's Manual*
- LUNWorks Read Me First file
- Installation instructions

■ Installing LUNWorks

Note: Remember to start up in 32-bit mode for Solaris 7 nodes only.

To install LUNWorks:

1. Log in as superuser.
2. Insert the LUNWorks installation CD in the CD drive.
3. Change the directory to the CD drive, where *x* is the drive number:

cd /cdrom/cdrom*x*

4. Type: **./install**

A message similar to the following is displayed:

```
Please make your install selection:
  1) Lunworks with JNI Driver
  2) Lunworks with Qlogic Driver

Select an Option: x

Processing package instance ...
Lunworks install set

Installing part 1 of 1
...
Installation of TRSANDoc was successful

Do you want to continue with the installation [y, n,?] y

Installing part 1 of 1
...
Installation of TRSANfcd was successful
```

6. Select the option depending on the type of HBA installed, JNI or QLogic.

Note: If you have previously installed LUNWorks, you may receive this message during the installation, reply **yes**:

Do you want to install these conflicting files [y, n, ?, q] **y**

7. Enter **y** when asked “Do you want to continue with the installation.”

The install script automatically installs LUNWorks and the HBA drivers.

The installation is now complete.

■ Configuration

After LUN*Works* is installed on a Sun Solaris node, the node must be added to the database. This is done through the administration application, which must be run on the Windows NT node, preferably one that is configured as the primary domain controller.

There are two ways to add a node to the database:

- Automatically
- Manually

Automatically

If the Solaris node is running an application that includes NetBIOS support (such as Samba), the Solaris node will be discovered and added to the SAN database when the LUN*Works* administration application is started on a Windows NT node.

Starting the application automatically initiates a scan for all nodes and devices found on the SAN. If a node is not added automatically, follow the procedure for adding nodes manually, see the following section.

Note: When adding Sun nodes to the database, make sure to run LUN*Works* on a Windows NT node that has an updated Hosts file.

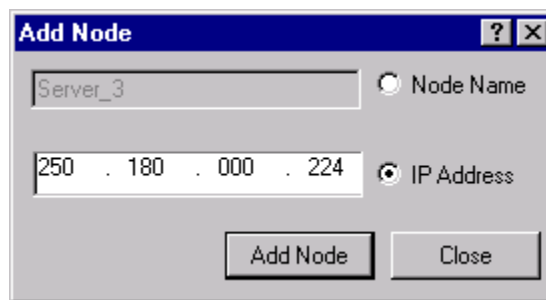
For more information, see the [“Pre-installation Checklist” on page 1-4](#).

Manually

To manually add a node to the database:

1. Obtain the node's host name or IP address.
 - Enter the command: **uname -n** to get the host name
 - Enter the command: **ifconfig -a** to get the IP address
2. Run the application on a Windows NT node.
3. Select **Database > Add Node**.

The Add Node dialog box appears:



4. Select Node Name or IP Address.
5. Enter the host name or IP Address and click the **Add Node** button.
6. Add more nodes or click **Close** to close the Add Node dialog box.
7. Verify that the host name of the Solaris node is displayed in the main window of the administration application.

You are now ready to set up storage devices for use with LUN*Works*.

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This chapter describes the storage management functions with *LUNWorks*.

■ Supported Partition Map Formats

Using the *LUNWorks* application on a Windows NT node, you can assign the following types of logical unit numbers (LUNs) or devices to Solaris nodes:

Unknown or Raw Formats

Unknown or raw disks are displayed with device names in `/dev/rdisk` and `/dev/dsk` on Solaris nodes. These device names are used to build UFS file systems using the Solaris Format utility.

NTFS Format

NTFS disks are displayed as usable devices on Solaris nodes.

CAUTION:

To use an NTFS device on a Solaris node, you must format it with a UFS file system, which erases all data on the NTFS disk.

UPM Format

There are three types of UPM partitions that exhibit the following behavior when UPM devices are assigned to Solaris nodes:

Table 2-1. UPM Formats

Database	Used in the database mirror set. Database partitions are not accessible to Solaris nodes.
Free space	Unused space on a UPM disk is called free space. Free space partitions are not accessible to Solaris nodes.
File system	<p>This UPM partition is designated for use as a file system partition. UPM file system partitions are displayed as Virtual LUNs on Solaris nodes.</p> <p>A Virtual LUN is really a UPM partition on a disk, but Solaris views it as a usable device that can be partitioned and used for up to seven UFS file systems.</p>

■ Preparing a Fibre Channel Disk

To prepare a disk subsystem:

1. Run the administration application and assign the desired devices to the Solaris node on a Windows NT node.
2. Enter: **ls /dev/dsk** to list the available disk devices on the Solaris node and to verify that the assigned disks are available.

The Solaris node creates eight slices or partitions for every accessible device. The slice names are listed as numbers 0 through 7, with slice number 2 representing the entire device.

For non-UPM devices, the node creates a single logical unit number or device name with eight slices. In contrast, when you assign a UPM device to a Solaris node, a separate device name with eight slices is listed for each UPM partition on the device. This is called a virtual LUN, because it is really a UPM partition on a disk, but Solaris views it as a separate device.

Slice Name Conventions

The slice name **c1t127d49s0** includes the following components:

- **c1** refers to the controller the storage device is connected to.
- **t127** refers to the target number for the LUN.

Note: Numbers under 127 represent targets that are on hubs, and numbers over 127 indicate targets that are on switches. If a slice has target number 127, the device is partitioned with UPM format.

- **d49** is the logical unit number of the device.
- **s0** is the slice or partition number of the device.

The storage area network (SAN) attached storage is now ready to be formatted.

Disk Setup Issues

- When selecting disks to partition, be careful *not* to select your internal disk.
- To support third-party failover software products on dual controller single loop SANs, LUN*Works* devices are listed twice as available disks when you run the Format utility. If you are using a dual controller single loop SAN, be careful to partition, create a file system, and mount only one instance of each SAN disk.

For example, if c1 and c2 are the Fibre Channel controllers, then c1t17d0 and c2t17d0 refer to the same disk. If you partition, mount, or create file systems on both instances of a disk, data corruption will occur.

Partitioning a Disk for use with Solaris

1. Run the Format utility.

A list of available devices appears with a prompt to specify a disk. The following example is sample output from a one controller, one loop, SAN configuration:

AVAILABLE DISK SELECTIONS:

```
0. c0t0d0 <Seagate Medalist 34342A cyl 8892 alt 2 hd 15 sec 63>
  /pci@1f,0/pci@1,1/ide@3/dad@0,0

1. c1t17d0 <SEAGATE-ST118202CLAR18-3525 cyl 6919 alt 2 hd 24 sec 214>
  /pci@1f,0/pci@1/scsi@1/sd_fcst@11,0

2. c1t127d20 <TR-UPM-4c72e14-1.00 cyl 54193 alt 2 hd 4 sec 640>
  /pci@1f,0/pci@1/scsi@1/sd_fcst@7f,14

3. c1t127d35 <TR-UPM-83c7723-1.00 cyl 6919 alt 2 hd 24 sec 214>
  /pci@1f,0/pci@1/scsi@1/sd_fcst@7f,23

4. c1t127d135 <TR-UPM-48e90487-1.00 cyl 6919 alt 2 hd 24 sec 214>
  /pci@1f,0/pci@1/scsi@1/sd_fcst@7f,87

5. c1t127d189 <TR-UPM-10a46fbd-1.00 cyl 6919 alt 2 hd 24 sec 214>
  /pci@1f,0/pci@1/scsi@1/sd_fcst@7f,bd

6. c1t127d250 <TR-UPM-5b3833fa-1.00 cyl 65441 alt 2 hd 1 sec 530>
  /pci@1f,0/pci@1/scsi@1/sd_fcst@7f,fa
```

Specify disk (enter its number):

2. Enter the disk number and press **[Return]**.

If there is no valid partition table, the Format utility prompts you to label the disk:

```
Disk not labeled.  Label it now? n
```

- a. Enter **[y]** and press **[Return]** if you want to label the disk with the default partition table.
 - b. Enter **[n]** and press **[Return]** if you want to manually set up the partition.
3. Enter **[p]** to select a partition table, and press **[Return]** at the format prompt.

4. Type **[p]** and press **[Return]** to display the current partition table at the partition prompt:

```
partition> p
Current partition table (default):
Total disk cylinders available: 54193 + 2 (reserved cylinders)
```

Part	Tag	Flag	Cylinders	Size	Blocks
0	root	wm	0 - 102	128.75MB	(103/0/0) 263680
1	swap	wu	103 - 205	128.75MB	(103/0/0) 263680
2	backup	wu	0 - 54192	66.15GB	(54193/0/0) 138734080
3	unassigned	wm	0	0	(0/0/0) 0
4	unassigned	wm	0	0	(0/0/0) 0
5	unassigned	wm	0	0	(0/0/0) 0
6	usr	wm	206 - 54192	65.90GB	(53987/0/0) 138206720
7	unassigned	wm	0	0	(0/0/0) 0

```
partition>
```

If you used the default partition table, slices 0, 1, and 6 are created.

Slice 2 represents the entire disk.

6. Enter the partition number that you want to change, and press **[Return]** at the partition prompt.

The partition information is displayed along with the enter partition ID tag prompt:

```
partition> 0
```

Part	Tag	Flag	Cylinders	Size	Blocks
0	root	wm	0 - 51	130.41MB	(52/0/0) 267072

```
Enter partition id tag[root]:
```

7. Assign a partition id tag, or press **[Return]** to accept the default value.
8. When prompted with: Enter partition permission flags[wu] : Press **[Return]** to accept the default setting.

CAUTION:

Do not enter a cylinder number that overlaps another partition. The exception to this rule is slice 2, which always represents the entire disk.

9. When prompted with: Enter new starting cyl, enter the starting cylinder number.
10. When prompted with: Enter partition size, enter the size of the desired partition in blocks (b), cylinders (c), megabytes (mb), or gigabytes (gb), and press [Return].
11. Repeat steps 6 through 10 for subsequent partitions.

Note: If extra partitions are defined in the partition table, delete them by using the following settings:

Enter partition id tag[swap]:

Enter partition permission flags[wu]:

Enter new starting cyl[103]: 0

Enter partition size[263680b, 103c, 128.75mb, 0.13gb]: 0

CAUTION:

Do not delete the information listed under slice 2.

Enter [p] at the partition prompt, and press [Return] to view the partition table.

Note the slice numbers that were used. This information, along with the disk name, will be needed in the section [“Creating a UFS File System” on page 2-6](#).

12. Enter **label** and press [Return] at the partition prompt.
13. Enter [y] and press [Return] at the Ready to label disk, continue? prompt.

At this point, the new partition table is written to the disk. If you view this disk's Device Information in the administration application on a Windows NT node, the device will be listed with a Sun partition map.

14. Enter [q] and press [Return] at the partition prompt.
15. Press [Return] and repeat the above steps to partition another disk.
16. Exit the Format menu when all disk are partitioned.

■ Creating a UFS File System

Now that your disks are partitioned, create a UFS file system on each partition.

1. Enter: **ls /dev/rdisk/c1*** and press [Return] at the # prompt.

In this example, c1 is the Fibre Channel controller.

Solaris lists all of the enabled physical and virtual LUNs on the Fibre Channel controller. For each device, all 8 slices are listed, regardless of whether they contain partitions.

```
# ls /dev/rdisk/c1*

/dev/rdisk/c1t127d135s0/dev/rdisk/c1t127d20s0/dev/rdisk/c1t127d35s0
/dev/rdisk/c1t127d135s1/dev/rdisk/c1t127d20s1/dev/rdisk/c1t127d35s1
/dev/rdisk/c1t127d135s2/dev/rdisk/c1t127d20s2/dev/rdisk/c1t127d35s2
/dev/rdisk/c1t127d135s3/dev/rdisk/c1t127d20s3/dev/rdisk/c1t127d35s3
/dev/rdisk/c1t127d135s4/dev/rdisk/c1t127d20s4/dev/rdisk/c1t127d35s4
/dev/rdisk/c1t127d135s5/dev/rdisk/c1t127d20s5/dev/rdisk/c1t127d35s5
/dev/rdisk/c1t127d135s6/dev/rdisk/c1t127d20s6/dev/rdisk/c1t127d35s6
/dev/rdisk/c1t127d135s7/dev/rdisk/c1t127d20s7/dev/rdisk/c1t127d35s7
/dev/rdisk/c1t127d189s0/dev/rdisk/c1t127d250s0/dev/rdisk/c1t17d0s0
/dev/rdisk/c1t127d189s1/dev/rdisk/c1t127d250s1/dev/rdisk/c1t17d0s1
/dev/rdisk/c1t127d189s2/dev/rdisk/c1t127d250s2/dev/rdisk/c1t17d0s2
/dev/rdisk/c1t127d189s3/dev/rdisk/c1t127d250s3/dev/rdisk/c1t17d0s3
/dev/rdisk/c1t127d189s4/dev/rdisk/c1t127d250s4/dev/rdisk/c1t17d0s4
/dev/rdisk/c1t127d189s5/dev/rdisk/c1t127d250s5/dev/rdisk/c1t17d0s5
/dev/rdisk/c1t127d189s6/dev/rdisk/c1t127d250s6/dev/rdisk/c1t17d0s6
/dev/rdisk/c1t127d189s7/dev/rdisk/c1t127d250s7/dev/rdisk/c1t17d0s7
```

2. Enter: **newfs *options* /dev/rdisk/*slice_name***, and press [Return] to create a UFS file system on the partition at the # prompt.

Solaris prompts you to confirm the request:

```
newfs: construct a new file system /dev/rdisk/slice_name: (y/n)?
```

3. Enter **[y]** and press **[Return]**.
4. Repeat the above steps to create UFS file systems on additional partitions.

Note: Enter the following command to make a Veritas File System (VxFS):

```
# mkfs -F vxfs /dev/rdisk/device partition_size
```

■ Mounting UFS File Systems

1. Create a mount point by entering the following command:
mkdir /mount_point, where *mount_point* is any user-defined name.

Note: To streamline your SAN administration procedures, you may want to create a directory, and then create mount points for each Fibre Channel file system within that directory, for example:

```
# mkdir /SAN
# mkdir /SAN/fibre1
```

2. Enter: **mount /dev/dsk/slice_name /mount_point** to mount a file system, for example:

```
# mount /dev/dsk/c1t17d0s0 /SAN/fibre1
```

3. Enter **ls /mount_point** to view the mounted file systems.

Note: To mount a Veritas File System (VxFS) enter the following command:

```
mount -F vxfs -o delaylog /dev/dsk/device /mount_point
```

■ Mounting File Systems Automatically

To mount file systems automatically at startup, add them to the **/etc/vfstab** file. For example, to add slice c1t17d0s0, enter it into the vfstab file.

- Device to mount: **/dev/dsk/c1t17d0s0**
- Device to fsck: **/dev/rdisk/c1t17d0s0**
- Mount point: **/SAN/fibre1**
- fstype: **UFS**
- fsck pass: **1**

The following example shows a vfstab file:

```
#device      device      mount      FS      fsck      mount      mount
#to mount    to fsck      point      type     pass      at boot    options
#
#/dev/dsk/c1d0s2 /dev/rdisk/c1d0s2 /usr      ufs      1          yes      -
fd          -          /dev/fd   fd        -         no        -
/proc       -          /proc     proc      -         no        -
/dev/dsk/c0t0d0s4 -          -          swap      -         no        -
/dev/dsk/c0t0d0s0 /dev/rdisk/c0t0d0s0 /          ufs      1          no        -
/dev/dsk/c0t0d0s6 /dev/rdisk/c0t0d0s6 /usr      ufs      1          no        -
/dev/dsk/c0t0d0s3 /dev/rdisk/c0t0d0s3 /var      ufs      1          no        -
/dev/dsk/c0t0d0s7 /dev/rdisk/c0t0d0s7 /export/home ufs      2          yes      -
/dev/dsk/c0t0d0s5 /dev/rdisk/c0t0d0s5 /opt      ufs      2          yes      -
/dev/dsk/c0t0d0s1 /dev/rdisk/c0t0d0s1 /usr/openwin ufs      2          yes      -
swap        -          /tmp      tmpfs     -         yes       -

# LUNWorks Devices
/dev/dsk/c1t17d0s0 /dev/rdisk/c1t17d0s0 /SAN/fibre1 ufs      1          yes      -
```

Using the vfstab File

If you unassign a device that is listed in the vfstab file and then reboot the system, the vfstab file will report errors and cause the system boot process to terminate at single-user mode:

```
/dev/rdisk/device_name: I/O error can't open /dev/rdisk/device_name

/dev/rdisk/device_name: CAN'T CHECK FILE SYSTEM

/dev/rdisk/device_name: UNEXPECTED INCONSISTENCY; RUN fsck MANUALLY

WARNING--Unable to repair one or more of the following filesystem(s):
SAN devices will be listed here

Run fsck manually (fsck filesystem...).

Exit the shell when done to continue the boot process
```

1. Press **[Ctrl+D]** to continue startup.
2. Log in to the Solaris node.
3. Reassign the missing devices on a Windows NT administration node.
4. Enter the command **mount -a** to mount all devices listed in the vfstab file on the Solaris node.

This chapter describes two LUN*Works* utilities for Solaris operating systems:

- `get_wwn`
- `get_loop_state`

■ `get_wwn`

The `get_wwn` utility lists all discovered devices and their worldwide names. The utility is found in the `/opt/TRSANfcd/bin` directory.

For example, with two controllers on the same loop, seeing the same storage, a result similar to the following appears:

```
system:# get_wwn
loop0
target 1 lun 0 wwn 0x2000002037119126
target 2 lun 0 wwn 0x200000203711534c
target 3 lun 0 wwn 0x2000002037114102
target 4 lun 0 wwn 0x20000020371140ff
target 5 lun 0 wwn 0x20000020371119a8
target 6 lun 0 wwn 0x2000002037119ba1
target 7 lun 0 wwn 0x2000002037116035
target 8 lun 0 wwn 0x2000002037116008

loop1
target 1 lun 0 wwn 0x2000002037119126
target 2 lun 0 wwn 0x200000203711534c
target 3 lun 0 wwn 0x2000002037114102
target 4 lun 0 wwn 0x20000020371140ff
target 5 lun 0 wwn 0x20000020371119a8
target 6 lun 0 wwn 0x2000002037119ba1
target 7 lun 0 wwn 0x2000002037116035
target 8 lun 0 wwn 0x2000002037116008
```

Note: The `get_wwn` utility provides information from memory rather than doing an active scan of the loop. During a system reboot, `get_wwn` is updated to reflect the current storage area network (SAN) world wide name (WWN) topology.

■ **get_loop_state**

The `get_loop_state` utility checks to see that the Fibre Channel disks are available, and reports on the status of the loop:

```
system:# get_loop_state  
  
loop0 is up  
  
loop1 is up
```

Troubleshooting

A

This appendix provides troubleshooting tips for LUN*Works* on Solaris operating systems.

■ No Devices are Available

If no storage area network (SAN) devices are listed on a Solaris node, find the cause below that best describes the situation, then attempt the solution.

Problem: Assigned SAN devices are not available on a Solaris node.

Cause:	Solution:
The host bus adapter (HBA) or drivers are not installed.	Install the HBA or drivers.
SAN-attached storage or other network hardware is powered off.	Power on the drives or network hardware.
Network cables are not connected properly.	Verify all cable connections.
There is a failure within the Fibre Channel loop.	Power down the Fibre Channel hardware, then power up the hardware to reset the Fibre Channel loop. Note: Power up the storage devices first, then the hubs and switches, then the LUN <i>Works</i> Windows NT administration node, and then all other nodes.
The Solaris node cannot access the SAN database because its Fibre Channel cable is not connected to the loop where the SAN database is located.	This problem is most likely to occur in a dual loop configuration in which the SAN database is accessible on one loop but not the other. Make sure the Solaris node is attached to the correct loop.
The Fibre Channel card has become unseated in the computer.	Shut down the computer, remove and reseat the card.
The Fibre Channel card, hub, switch, or storage controller is bad.	Run device and vendor specific diagnostics and replace any bad components

■ Error During Mounting: Not a Block Device

Problem: When mounting a device, you get the following error message: `mount : /dev/rdisk/ slice_name not a block device`

Cause:	Solution:
There was an error in the mount command. This error occurs when you try to mount a disk by using the raw device name rather than the correct block device name.	<p>Enter the correct command: <code>mount/dev/dsk/slice_name/mount_point</code></p> <p>Note: Always create UFS/VxFS file systems on “raw” device names and mount file systems on “block” device names, example:</p> <ul style="list-style-type: none"> • Raw device name: <code>/dev/rdisk/device</code> • Block device name: <code>/dev/dsk/device</code>

■ A Device is Not Showing Up

Problem: A Fibre Channel device is not showing up on a Solaris node.

Cause:	Solution:
<p>LUNWorks uses an alternate SCSI disk driver, which allows LUNWorks to co-exist with the standard SCSI disk driver that controls things such as internal SCSI buses.</p> <p>LUNWorks for Solaris has a separate driver class for the Qlogic host bus adapter driver: <code>tran_scsi</code> instead of <code>scsi</code>.</p>	<p>If the <code>driver.conf</code> file for that type of Fibre Channel device has the following line:</p> <pre>name="my_driver" class="scsi"</pre> <p>Change or add another line that reads:</p> <pre>name="my_driver" class="tran_scsi"</pre>

■ A Node is not Discovered by Administration Node

When adding Solaris nodes to the SAN, the following errors may occur:

- After adding a Solaris node to the SAN, it is not listed in the nodes pane of the *LUNWorks* administration application on a Windows NT node.
- When using the Add Node command, the *LUNWorks* application reports that it “cannot resolve IP address to host name” or “cannot ping *LUNWorks* on the node.”

Problem: A Solaris node cannot be successfully added to the SAN database.

Cause:	Solution:
There is an IP connectivity problem.	<p>Ping both nodes to verify IP connectivity between the nodes.</p> <ul style="list-style-type: none"> • Enter the following command to ping the Solaris node from the Windows NT node: c: ping -t <i>ip_address</i> • Enter the following command to ping a Windows NT node from a Solaris node: ping -s <i>ip_address</i>
The host file on either the Windows NT or Solaris node has not been updated properly.	<p>On a Solaris node that is not running Samba and does not have DNS Services configured, verify that the <code>/etc/hosts</code> file is updated correctly with the host name and IP addresses of all nodes on the SAN.</p> <p>On Windows NT nodes, verify that the <code>winnt\system32\drivers\etc\Hosts</code> file has been updated.</p>
<i>LUNWorks</i> may not be running on the Solaris node.	<p>Enter the following command to verify that the service is running:</p> <p># ps -ef grep Service.</p>
There is a connectivity problem between the Solaris node and the SAN database.	<p>Run the <code>get_wwn</code> utility to see if any devices are attached.</p>

■ A Device Cannot be Disabled from a Solaris Node

Problem: When unassigning a device from a Solaris node, the Windows NT administration node displays a `Disable Device Failed` error message.

Cause:	Solution:
The device contains a mounted file system that is in use.	Stop any processes that are using the file system, then unassign the device with through the administration application.
The device is configured to be used with third-party storage management software, such as Solstice DiskSuite or Veritas Volume Manager. LUNWorks has no way of telling a third-party storage management application that a particular device needs to be removed from its configuration.	Before unassigning devices, manually remove them from the control of third-party storage management software.
The device is in use by an application that accesses it directly. LUNWorks has no way of knowing what program is using the disk in question, or how to make it stop without interrupting what may be a critical process.	Before unassigning this type of device, shut down the program that is using it.

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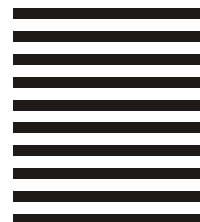
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