5

Disk

ENlighten/DSM helps you easily manage space on disk partitions, and configure and manage NFS servers. You can use four different ways of obtaining disk filesystem information: User summaries, Group summaries, disk filesystem process summaries, and/or specific file searches. The actual options are:

- Usage by Filesystem
- Usage by Username
- Usage by Groupname
- File Search
- Processes by Filesystem
- Save Current Snapshots
- Compare Snapshots
- NFS

The rest of this section details how to build snapshots and use them for the processes listed above. It also shows how to use NFS to mount and export directories.

Building Snapshots

To increase the speed of these programs and cut down on disk access time, ENlighten/DSM creates a database (disk snapshot) of all files in the requested filesystem once and then uses this database to perform the required tasks. The amount of time needed to create this database is dependent on the size of the filesystem you wish to monitor.

To update the snapshot of a filesystem, highlight it in the list of filesystems and click the Rebuild button located on the right side of the menu bar. Then click the button for the process you want to update: User Sum., Group Sum., or File Search.

ENlighten/DSM will display a window indicating when the last snapshot of your request was taken. If you want to refresh this disk snapshot, click the appropriate button. To save the new snapshot, see "Save Current Snapshots" on page 5-27.

☞   Disk summaries and searches are performed on this snapshot. Consequently, you should rebuild your snapshots periodically to reflect a more current state of the disk.

Usage By Filesystem

You can use this command to view Disk Usage by Filesystem. A window showing all mounted file systems as well as their current usage of disk space and inodes will appear ().
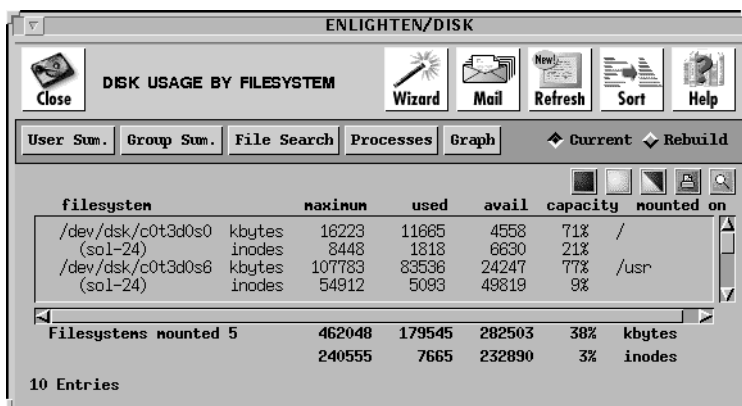

Figure 5-1 Disk Usage By Filesystem

You now have the option to look at:

- User Sum.   Summarize disk usage by username

- Group Sum.   Summarize disk usage by user group

- File Search   Search for files based on search criteria

- Processes   View the processes using a filesystem

- Graph   Graph the disk usage

User Sum.

Highlight the filesystems you wish to summarize, then click the User Sum. button. The Disk Usage Information By Users window will appear summarizing the disk usage by user for the highlighted filesystems. This window shows you the user name, real name, telephone number, number of files owned by the user, and total disk usage (in KB).

The disk usage summaries are based on previously taken disk snapshots. Consequently, the displayed data may not be current. To rebuild the disk snapshots before the summary is made, click the Rebuild button in the previous window. See "Building Snapshots" on page 5-2 for more details.

Within the Disk Usage Information By Users window, you now have the following options:

- View Files   View a list of files owned by the user(s) and perform further operations on them

- Compare Snapshots   Compare the current snapshot to a previously saved one

- Save Snapshots   Save the current snapshot

- Graph   Graph the disk usage of the user(s)

View Files

By highlighting specific Username entries and clicking on the View Files button, you can view a list of files owned by the highlighted users and then manipulate the file characteristics. For more details, refer to "View Files" on page 5-9.

Compare Snapshots

You can compare the state of the current partition (snapshot) to that of one from a previous moment in time. You are able to view summaries of changes, see detailed lists of changes, and look for changes based on search criteria. To compare an existing snapshot to a previously saved one, highlight the disk partitions (filesystems) you want to compare and click the Compare Snapshot button to run the comparison. For more details, see "Compare Snapshots" on page 5-14.

Save Snapshots

To save existing snapshots, highlight the disk partitions you want to save and click the Save Snapshot button to create a dynamic new snapshot. For more details, see "Save Current Snapshots" on page 5-27.

Graph

To graph the disk usage summary by user, highlight the information you wish to view and then click the Graph button. A window will appear displaying the highlighted items in a graphical format.

Group Sum.

Highlight the filesystems you wish to summarize, then click the Group Sum. button. The Disk Usage Information By Group window will appear summarizing the disk usage by user for the highlighted filesystems. This window shows you the group name, number of files owned by the group, and total disk usage (in KB).

The disk usage summaries are based on previously taken disk snapshots. Consequently, the displayed data may not be current. To rebuild the disk snapshots before the summary is made, click the Rebuild button in the previous window. See <u>"Building Snapshots" on page 5-2</u> for more details.

Within the Disk Usage Information By Group window, you now have the following options:

- View Files   View a list of files owned by the group(s) and perform further operations on them

- Compare Snapshots   Compare the current snapshot to a previously saved one

- Save Snapshots   Save the current snapshot

- Graph   Graph the disk usage of the group(s)

View Files

By highlighting specific Groupname entries and clicking on the View Files button, you can view a list of files owned by the highlighted users and then manipulate the file characteristics. For more details, refer to <u>"View Files" on page 5-9</u>.

Compare Snapshots

You can compare the state of the current partition (snapshot) to that of one from a previous moment in time. You are able to view summaries of changes, see detailed lists of changes, and look for changes based on a search criterion. To compare an existing snapshot to a previously saved one, highlight the disk partitions (filesystems) you want to ompare and click the Compare Snapshot button to run the comparison. For more details, see <u>"Compare Snapshots" on page 5-30</u>.

Save Snapshots

To save existing snapshots, highlight the disk partitions you want to save and click the Save Snapshot button to create a dynamic new snapshot. For more details, see <u>"Save Current Snapshots" on page 5-27</u>.

Graph

To graph the disk usage summary by group, highlight the information you wish to view and then click the Graph button. A window will appear displaying the highlighted items in a graphical format.

File Search

There will be times when you need to perform disk file searches for information not readily apparent, such as file size, file types, creation date of a file, and who owns a particular file. Highlight the disk partitions (filesystems) you wish to query and click the File Search button to find, and then view, these files through a query process.

The File Search Query window will appear where you can enter your search criteria. If you do not fill in a field, it is not used as part of the search pattern.

Processes

You can use this command to display all currently running processes that are accessing the highlighted filesystems. To view the processes, highlight the filesystems you wish to view and then click the Processes button. A window will appear displaying all processes accessing the highlighted filesystems.

The Processes By Filesystem functionality does not work correctly in version 4.1x of the Sun operating system. The resulting report may be incomplete and/or display processes that are NOT associated with the selected partitions.

Graph

To graph the disk usages, highlight the information you wish to view and then click the Graph button. A window will appear displaying the highlighted items in a graphical format.

Usage by Username

You can use this command to see, at a glance, a summary of disk usage by user for currently mounted file systems. The Select Disk Partitions window will appear displaying all currently mounted file systems ([Figure 5-2](#)).
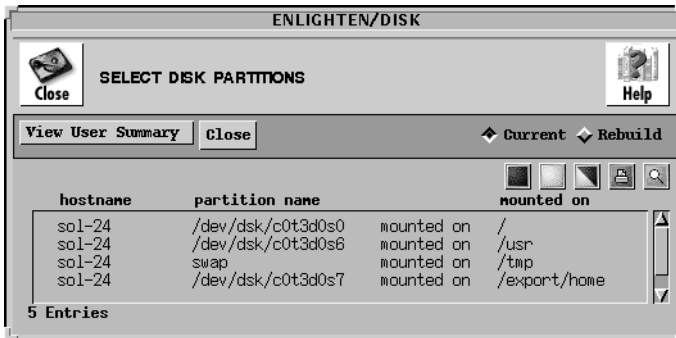

Figure 5-2 Select Disk Partitions window

Highlight the appropriate disk partitions for summarizing from the list box and click the View User Summary button. The Disk Usage Information By Users window will appear ([Figure 5-3](#)). You can sort this information, mail it to selected users, or print it. Plus, you now have the following options:

- View Files — View a list of files owned by the user(s) and perform further operations on them

- Compare Snapshots — Compare the current snapshot to a previously saved one

- Save Snapshots — Save the current snapshot

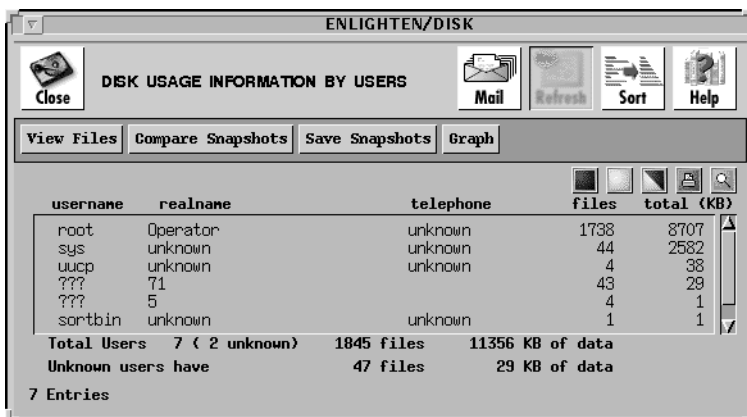- Graph — Graph the disk usage summary of the user(s)

Figure 5-3 Disk Usage Information By Users window

View Files

By highlighting specific Username entries and clicking the View Files button, you can further view a list of files owned by the highlighted users, as shown in the File Systems Detail window (Figure 5-4).

Figure 5-4 File Systems Detail window

Now you can perform the following operations to further manipulate the files in the list box:

- Edit   Change the contents of the marked files

- View   View the contents of the marked files

- Stats   Display statistics about the marked files

- Delete   Remove the marked files from the system

- Backup   Back up the marked files

- chmod   Change the read, write, and/or execute permissions of the marked files

- chgrp   Change the group(s) to which the marked files belong

- chown   Change the owner of the marked files

- Custom   Define and execute a UNIX command on the marked files

Edit

Use this command to edit files ('vi'). Highlight the files you wish to edit and click the Edit button. A pop-up confirmation window will appear. For each file, select Yes to edit the file, No to skip that file and go to the next one, All to edit all files, or Cancel to abort the command. You MUST utilize standard 'vi' commands to edit any files (or a hex editor if this is a binary file).

When you quit 'vi' with the `:q` command, the following message will appear: "Hit the Return key to continue". This action will close the window and allow you to continue using other ENlighten/DSM options.

View

Use this command to view the contents of files. Highlight the files you wish to view and then click the View button. A pop-up confirmation window will appear. For each file, select Yes to view the file, No to skip that file, All to view all files, or Cancel to abort the command. If you select Yes or All, ENlighten/DSM will activate a window showing the contents of the file.

Once the (last) file is displayed, the following message will appear: "Hit the Return key to continue". This action will close the window and allow you to continue using other ENlighten/DSM options. You cannot use the View command to modify files.

Stats

Use this command to display a statistical summary for each file (Figure 5-5). Highlight the files you want and click the Stats button. A window will appear with the statistics for the highlighted file. If you selected more than one file, click the Next button to view statistics on the next file you selected.
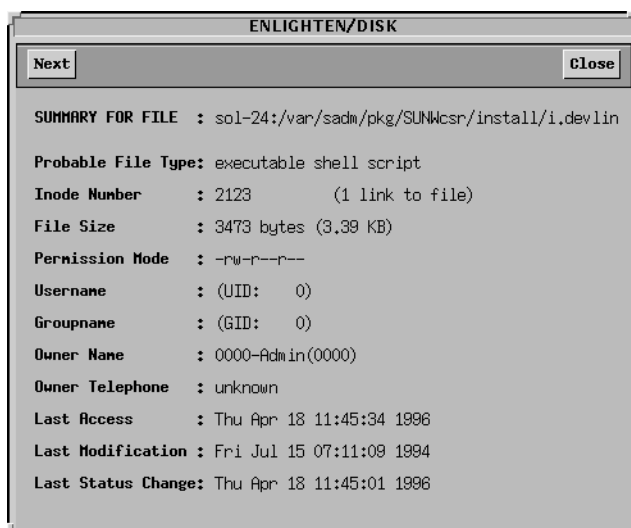


```
                    ENLIGHTEN/DISK
  Next                                            Close

  SUMMARY FOR FILE  : sol-24:/var/sadm/pkg/SUNWcsr/install/i.devlin

  Probable File Type: executable shell script

  Inode Number      : 2123        (1 link to file)

  File Size         : 3473 bytes (3.39 KB)

  Permission Mode   : -rw-r--r--

  Username          : (UID:    0)

  Groupname         : (GID:    0)

  Owner Name        : 0000-Admin(0000)

  Owner Telephone   : unknown

  Last Access       : Thu Apr 18 11:45:34 1996

  Last Modification : Fri Jul 15 07:11:09 1994

  Last Status Change: Thu Apr 18 11:45:01 1996
```

Figure 5-5 Statistical File Summary

Delete

Use this command to remove files from the system. Highlight the files you wish to delete and click the Delete button. ENlighten/DSM will prompt you to confirm your action. Once a file has been deleted, it cannot be recovered.

☞ If a selected file is actually a directory, ENlighten/DSM will not remove it unless it is empty. If the directory is not empty, a status message will appear stating this.

Backup

Use this command to make a back up copy of each highlighted file. Highlight the files you wish to back up and click the Backup button. A pop-up window will appear showing the different backup devices available. Select one of them. ENlighten/DSM will then ask for confirmation before performing the backup.

During the backup, a window will display the progress of the backup. When the backup is complete, a summary log will be displayed in the same window. Press the <return> key to continue using other ENlighten/DSM options.

☞ If a selected file is actually a directory, only the directory itself will be backed up. Subfiles and/or subdirectories of the highlighted directory will *NOT* be backed up.

Chmod

Use the chmod command to manipulate the read, write, and/or execute permissions of a file. Highlight the files you wish to change and click the Chmod button. A pop-up window will appear showing the current set of permissions for that file (Figure 5-6).
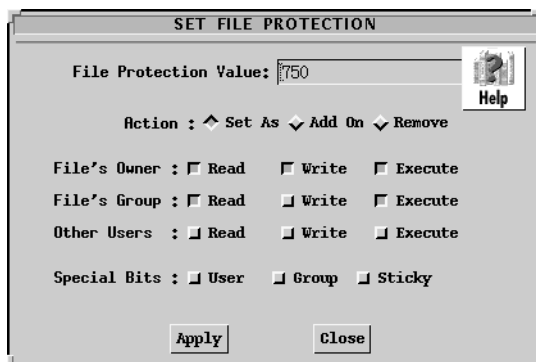
Figure 5-6 File Permissions

You can enter the new permissions numerically in the first field or select the desired permissions from the available check boxes. Furthermore, you can specify the permissions be set as is, added on to, or subtracted from the current mode.

Once you've made your choices, click the Apply button. Another pop-up window will ask you to confirm your changes.

Chgrp

Use the chgrp command to change the group(s) to which a file or files belong. Highlight the files you wish to change and click the Chgrp button. A pop-up window will appear. Use this to specify the new group(s).

You can click the arrow button to access a list of valid User Groups. A window will appear showing all Groups. Highlight the desired Group(s) and then click the Apply button. You must specify a valid User Group name. Another pop-up window will ask you to confirm your changes.

Chown

Use the chown command to change the ownership of a file. Highlight the files you wish to change and click the Chown button. A pop-up window will appear. Use this to specify the new username.

You can click the arrow button to access a list of valid usernames. A window will appear showing all Users. Highlight a single user and click the Apply button. You must specify a valid username. Another pop-up window will ask you to confirm your changes.

Custom

Use this command to directly apply UNIX commands to files without having to exit ENlighten/DSM. The commands entered can be any valid UNIX commands. Highlight the files you need to use for your custom command and click the Custom button.

A pop-up window will appear. Enter the appropriate UNIX command and click the Apply button. Another pop-up window will ask you to confirm your action. Once the command has executed successfully, the following message will appear: "Hit the Return key to continue". This action will close the window and allow you to continue using other ENlighten/DSM options.

ENlighten/DSM supports using the character macro % as part of the command. If you use this macro, ENlighten/DSM will replace it with the name of the current file. If not, ENlighten/DSM will automatically append the name of the current file to the command before executing it.

Compare Snapshots

You can compare the state of the current partition (snapshot) to that of one from a previous moment in time. You are able to view summaries of changes, see detailed lists of changes, and look for changes based on a search criterion. To compare an existing snapshot to a previously saved one, highlight the disk partitions (filesystems) you want to compare and click the Compare Snapshot button to run the comparison.

Save Snapshots

To save existing snapshots, highlight the disk partitions you want to save and click the Save Snapshot button to create a dynamic new snapshot. For more details, see <u>"Save Current Snapshots" on page 5-27</u>.

Graph

To graph the disk usages, highlight the information you wish to view and then click the Graph button. A window will appear displaying the highlighted items in a graphical format.

Usage by Groupname

You can use this command to see, at a glance, a summary of disk usage by user group for currently mounted file systems. The Select Disk Partitions window will appear displaying all currently mounted file systems (Figure 5-7).
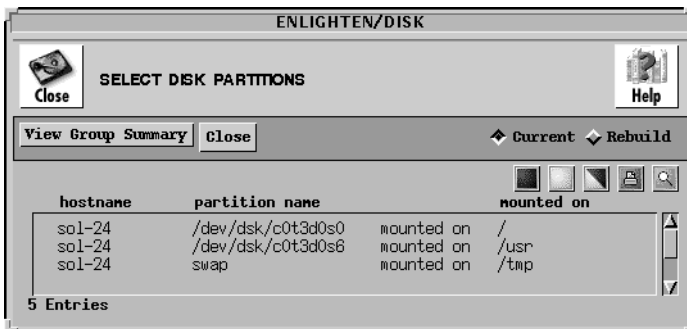
Figure 5-7 Select Disk Partitions window

Highlight the disk partitions you want to monitor from the list box and click the View Group Summary button. The Disk Usage Information By Group window will appear (Figure 5-8). Within this window, you now have the following options:

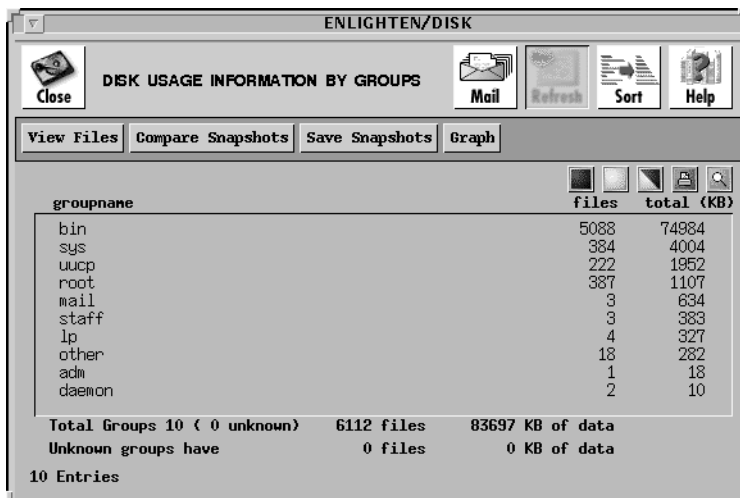|		
•	View Files	View a list of files owned by the group(s) and perform further operations on them
•	Compare Snapshots	Compare the current snapshot to a previously saved one
•	Save Snapshots	Save the current snapshot
•	Graph	Graph the disk usage of the group(s)

Figure 5-8 Disk Usage Information By Group window

View Files

By highlighting specific Groupname entries and clicking the View Files button, you can further view a list of files owned by the highlighted users and then manipulate the file characteristics. For more details, refer to "View Files" on page 5-9.

Compare Snapshots

You can compare the state of the current partition (snapshot) to that of one from a previous moment in time. You are able to view summaries of changes, see detailed lists of changes, and look for changes based on a search criterion. To compare an existing snapshot to a previously saved one, highlight the disk partitions (filesystems) you want to compare and click the Compare Snapshot button to run the comparison. For more details, see "Compare Snapshots" on page 5-30.

Save Snapshots

To save existing snapshots, highlight the disk partitions you want to save and click the Save Snapshot button to create a dynamic new snapshot. For more details, see "Save Current Snapshots" on page 5-27.

Graph

To graph the disk usages, highlight the information you wish to view and then click the Graph button. A window will appear displaying the highlighted items in a graphical format.

File Search

There will be times when you need to perform disk file searches for information not readily apparent, such as file size, file types, creation date of a file, and who owns a particular file. You can use this command to find these files.

A window will appear listing all the currently mounted filesystems (Figure 5-9). Highlight the disk partitions (filesystems) you wish to query and then click the Search Parameters button.
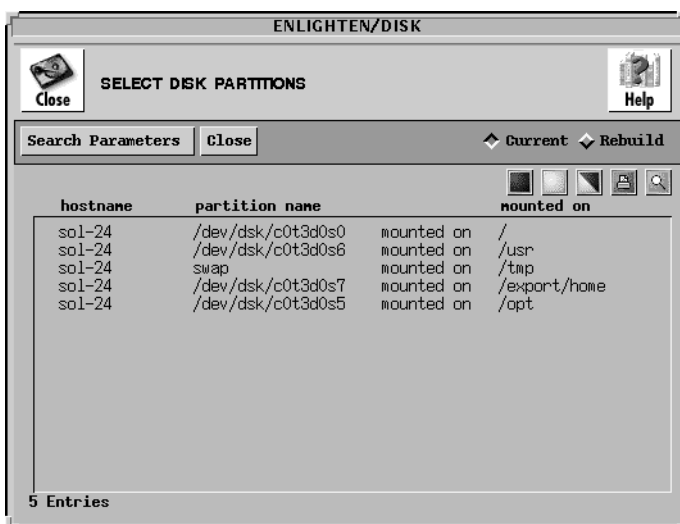

Figure 5-9 Currently Mounted Filesystems

The File Search Query window will then appear (Figure 5-10). You can now fill in the fields to use in your search pattern. If you do not fill in a field, it is not used as part of the search.
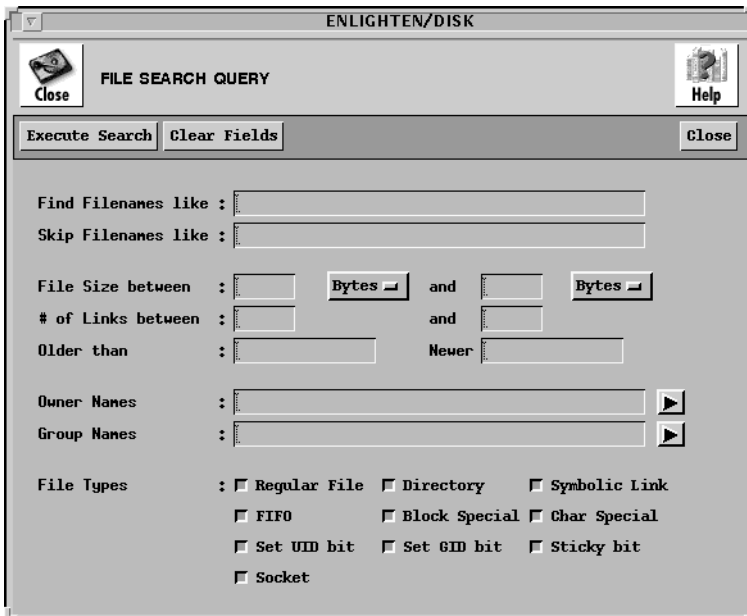
Figure 5-10 File Search Query window

The rest of this section describes the functionality of this window's fields and buttons.

Fields

This window contains the following fields:

Find Filenames like

Use this field to specify filenames to use in the search pattern. The filenames can contain the standard UNIX wild card matching characters '*', '?', and '[ ]'. This field will accept more than one entry. Leave a blank space between each unique filename for multiple entries.

Skip Filenames like

This is the opposite of the Find Filenames like field. The filenames entered here create an exclusion list. Any filename entered here will NOT be matched by the search. This field uses the same format as the previous field.

File Size between ... and

Every file residing on the system requires space. This space is referred to as the file size. Any input for these fields specifies the minimum and/or maximum file size a file can have as part of the search routine. If a file is smaller than the amount entered in the first field, the search routine will exclude it. Conversely, if the file is larger than the amount entered in the second field, the search routine will also exclude it. You can also use these two fields together to specify a range of file sizes in your search.

To change the default size, enter the data in the format `N unit`, where `N` is the numeric size to search for and `unit` is one of the following units of measure:

- KB = Kilobytes
- MB = Megabytes
- GB = Gigabytes

You can either add the unit directly in the field or just add the numeric size and click the Bytes button to select the unit.

# of Links between ... and

Files on a UNIX system can have more than one name (every file is considered to have one link to its original name). If they do have more than one name they are referred to as linked files. In many cases a file may have more than one link.

Any input for these fields specifies the minimum and/or maximum links a file can have as part of the search routine. If the number of links for a file is smaller than the amount entered in the first field, the search routine will exclude it. Conversely, if the number of links is greater than the amount entered in the second field, the search routine will also exclude it. You can also use these two fields together to narrow the search to a specific link count range.

Older than

When a file is created, its creation date is stored by the filesystem in what is called an inode. Every time the file is modified the date of the modification is updated in the inode. Specifying an entry in this field

will limit the search to any files created <u>after</u> the date entered. You can use one of two formats for the date. See [Appendix C, "Time Formats,"](#) for more details.

Newer

Specifying a date in this field (which has the same format as the previous field) will limit the search to any files created before the date entered. You can also use the Older than and Newer fields together to specify a range of creation times in your search.

Owner Names

Every file on the system has an owner. In most cases the owner is the user who created the file. Use this field to find only those files whose owners match the names of the users entered. Click the arrow button and a pop-up menu will appear listing all Owner names. Highlight the Owner names you wish to search on, then click the Apply button.

This field will accept more than one entry. Leave a blank space between each unique owner for multiple entries. To exclude any files owned by certain users, place a '!' before those usernames.

Group Names

Every file on the system belongs to a user group. Use this field to find only those files whose group ownership matches the user group names entered in this field. Click the arrow button and a pop-up menu will appear listing all Group Names. Highlight the Group Names you wish to search for, then click the Apply button.

This field will accept more than one entry. Leave a blank space between groups for multiple entries. To exclude any files owned by certain groups, place a '!' before those group names.

File Types

Use this field to select specific file types for the search. To do so, click in the box preceding the file description. You may select more than one file type. The default is all file types are used:

Regular file	Directory	Symbolic Link
FIFO (pipe)	Block Special	Char Special
Set Userid Bit	Set Groupid Bit	Sticky bit
Socket		

Buttons

This window contains the following buttons:

Execute Search

The search criteria may use one or any combination of the preceding fields. Once you've entered your search criteria, click the Execute Search button. The File Systems Detail window will appear with a list of the files that met the criteria. You may then execute more commands such as edit, delete, and chown to manipulate the displayed files' characteristics. See for more details on how to use the File Systems Detail window.

Clear Fields

Click this button to clear the existing choices in all fields.

Close

Click this button to discard any changes and close the window.

Processes by Filesystem

You can use this command to display a report on all currently running processes associated with the highlighted Disk Partitions. The Select Disk Partitions window will appear displaying all currently mounted filesystems, along with where they are mounted (Figure 5-11).
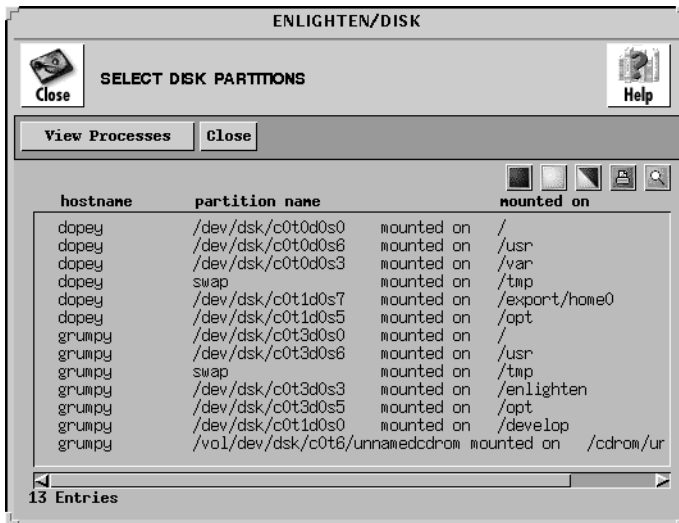

Figure 5-11 Select Disk Partitions window

Highlight the desired disk partitions you want to use to further examine their associated processes and click the View Processes button. The Processes By Filesystem window will appear (Figure 5-12).

> ☞ The Processes By Filesystem functionality does not work correctly in version 4.1x of the Sun operating system. The resulting report may be incomplete and/or display processes that are NOT associated with the selected partitions.
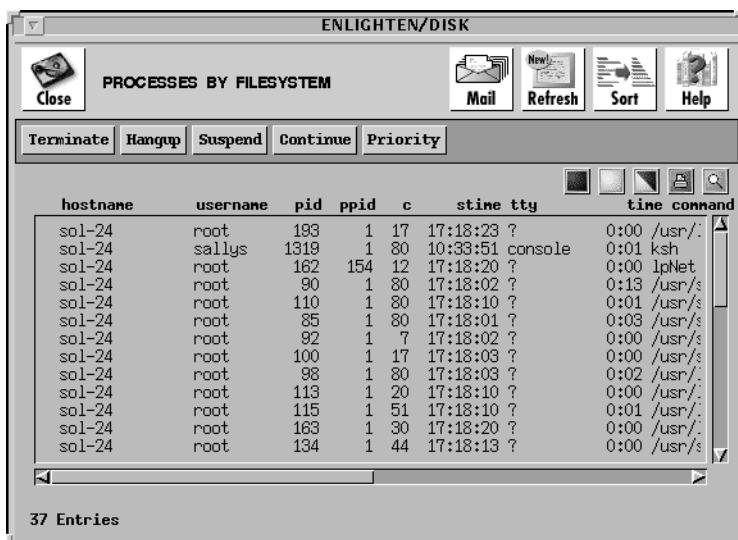
Figure 5-12 Processes by Filesystem window

Then you can select a process and use the menu buttons to impact it, as described in the following subsections.

Terminate

This command is very powerful and will immediately kill the highlighted process. This command will not kill related processes, so if there are child processes running they will become orphans and will have to be terminated separately. A pop-up window will prompt you for verification to terminate the process.

Hangup

This command is similar to the Terminate command, except it provides enough time for the process to shut down properly. This means the process can close any files and terminate any child processes. A pop-up window will prompt you for verification to hang up the process.

Suspend

This command stops a process from working, but it does not terminate the process. Essentially, this command puts a process on hold; it can be activated again at a later time. You must use the Continue command to re-activate a suspended process. A pop-up window will prompt you for verification to suspend the process.

Continue

This command allows you to re-activate a process that was previously put on hold by a Suspend command. A pop-up window will prompt you for verification to resume the process.

Priority

This command allows you to change the priority of a process. This priority determines when the CPU acts on a process. It may have a value from -20 to +20; the smaller the number, the higher the priority. Clicking the Priority button activates a Process Priority window. You can enter the desired priority or use the arrow buttons to make your selection.

Save Current Snapshots

ᴇɴlighten/ᴅsᴍ creates disk snapshots (databases) for use in its monitoring of disk usage. These snapshots can be saved for historical purposes and then used to determine if changes have been made to a partition. They can also be used for security-related issues (see Appendix A, "ᴇɴlighten/ᴅsᴍ Basics," in the *ᴇɴlighten/ᴅsᴍ User Guide*).

There are two ways to store a snapshot. You can store it as the Master Snapshot. This is a snapshot of what you believe is a secure system state. This is usually made before users are given access to the partition or after a system cleanup is done. Then you can use this Master state to gauge if changes are made over time to that partition.

The second way is similar to the first, except you can assign a name to the saved snapshot. These snapshots can then be used to represent intermediate states.

Either way, once you select this menu item, a window will appear listing all currently mounted filesystems (Figure 5-13). Highlight the disk partitions for which you want to make a current snapshot and click the Save Snapshot button.
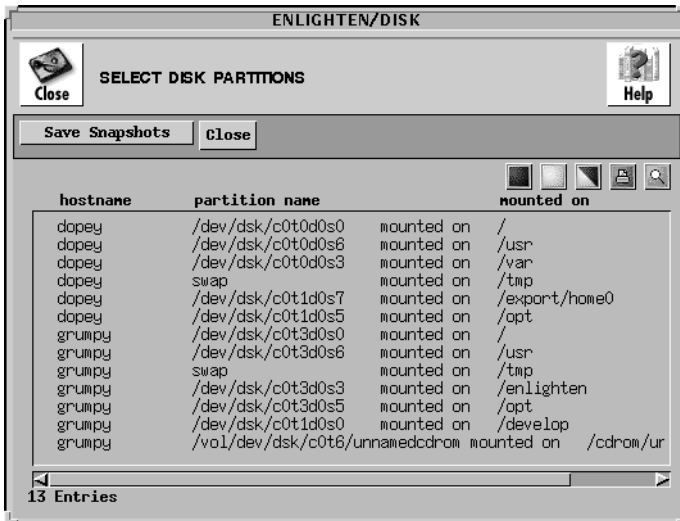
Figure 5-13 Currently Mounted Filesystems

The Save Selected Disk Snapshots window will appear (Figure 5-14). The names of the selected partitions are automatically imported into the Snapshot from the partition column in the window. You may also add other partition names or modify the existing ones.
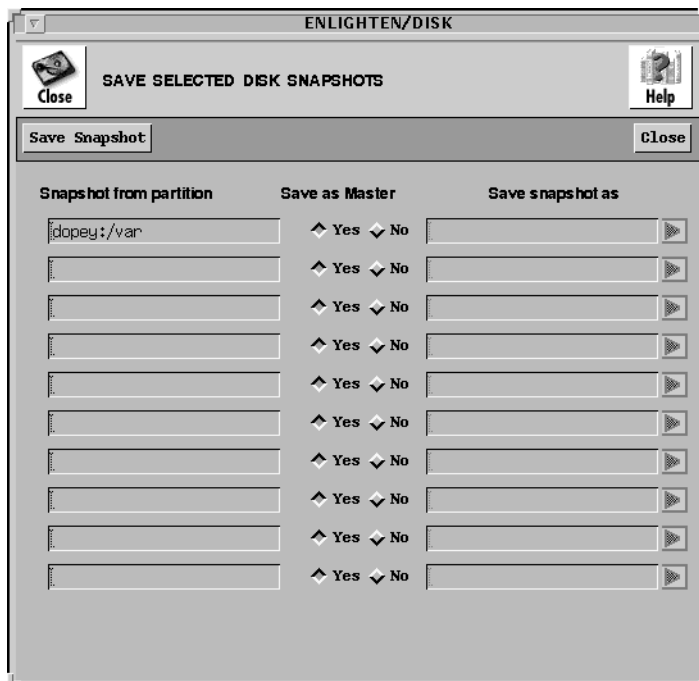
Figure 5-14 Save Selected Disk Snapshots window

Then you must choose for each partition whether to save the snapshot
as the master snapshot (default) or not. If you do, click the Yes button
in the Save as Master column. If not, click the No button and enter
a unique name for this snapshot in the appropriate Save snapshot
as field.

Once you've made all your selections, click the Save Snaphot button.
ENlighten/DSM will then notify you as each snapshot is saved. If you've
requested an existing snapshot be overwritten, you will be prompted
for confirmation before doing so.

Compare Snapshots

Disk snapshots provide a detailed description of a disk partition at a given moment in time. You can use this menu item to compare the state of the current partition (snapshot) to that of one from a previous moment in time. A window will appear listing all currently mounted filesystems (Figure 5-15).
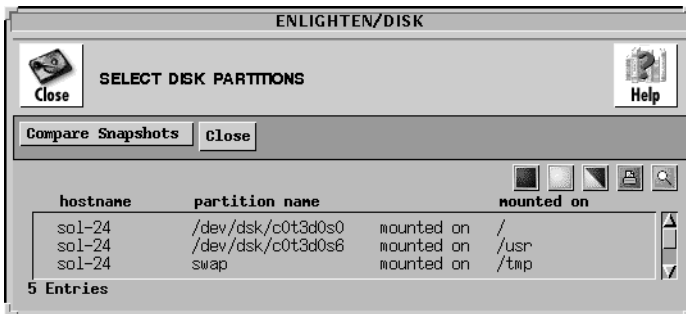

Figure 5-15 Currently Mounted Filesystems

Highlight the disk partitions (filesystems) for which you would like to perform a comparison and click the Compare Snapshot button. The Select Saved Snapshots window will appear (Figure 5-16). You can use this window to look at a summary of the changes, view a detailed list of the changes, or search for changes based on a query process.

Within this window, you must decide, for each partition, if the comparison should be made against the partition's master snapshot or against another named snapshot for this partition.
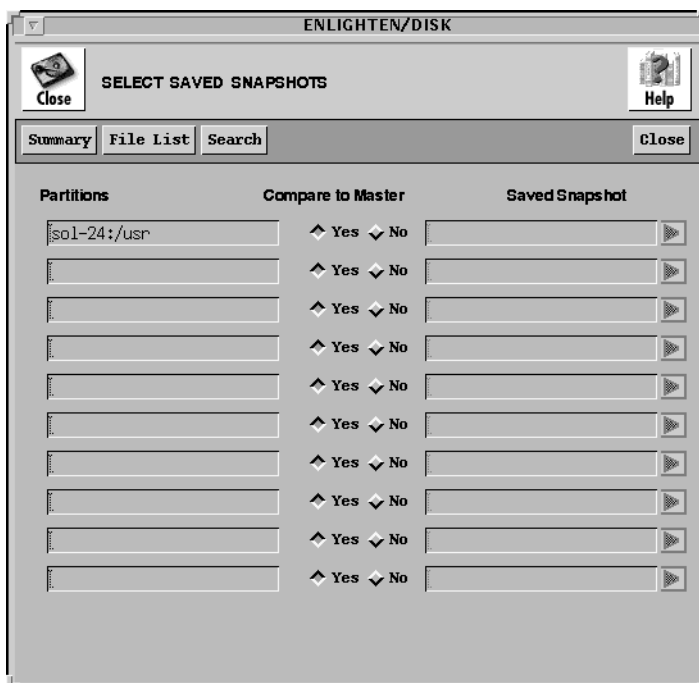
Figure 5-16 Select Saved Snapshots window

To compare against a named snapshot, click the No button under the Compare to Master column. Then, enter the name of the previously saved snapshot in the appropriate Saved Snapshot field. You can also click the arrow button on the right to bring up a window containing a list of all saved snapshots for that partition and select one of them.

☞ Partitions of the same name, but from different systems, can be compared. For example, the / partition from the host athens can be compared to the / partition from the host paris. You can use this to help maintain consistency of static partitions (partitions that should not change much) across hosts.

Finally, you also need to choose how you want to compare the snapshots by selecting one of this window's buttons:

- Summary   Get a summary of the changes

- File List   Get a list of all changes

- Search   Search further for certain types of changes

Summary

Click the Summary button to view a summary of the changes. Each user who had a file changed is listed in this window (Figure 5-17).

Figure 5-17 User Files Changed

ENlighten/DSM monitors file that are/have

- New files
- Lost files
- Renamed files
- Increased in size
- Decreased in size
- Changed modes
- Been read

- Been updated
- New owners
- New group owners

and shows in the list box how many files have changed in each category for every user displayed there.

☞ The summary of snapshot comparisons is a time-consuming action, as are all disk comparison functions. It may take several minutes to gather all the information for large or multiple partitions.

The rest of this subsection details how to use the Summary of Changes for Disk Partitions window buttons.

View Files

By highlighting specific Username entries and clicking the View Files button, you can view a more detailed list of file changes and then manipulate the file characteristics. To use the resulting List of Changed Files window, refer to .

Graph

To graph the disk changes, highlight the information you wish to view and then click the Graph button. A window will appear displaying the highlighted items in a graphical format.

File List

Click the File List button to see a detailed list of all files that have been changed in some way. Every file that has changed (as listed in) is detailed in this window ().

Often, this report consists mostly of files that have been read. Consequently, the report can be very large. You may want to first run a Summary (see) or Search for changes (see) before using the File List option.
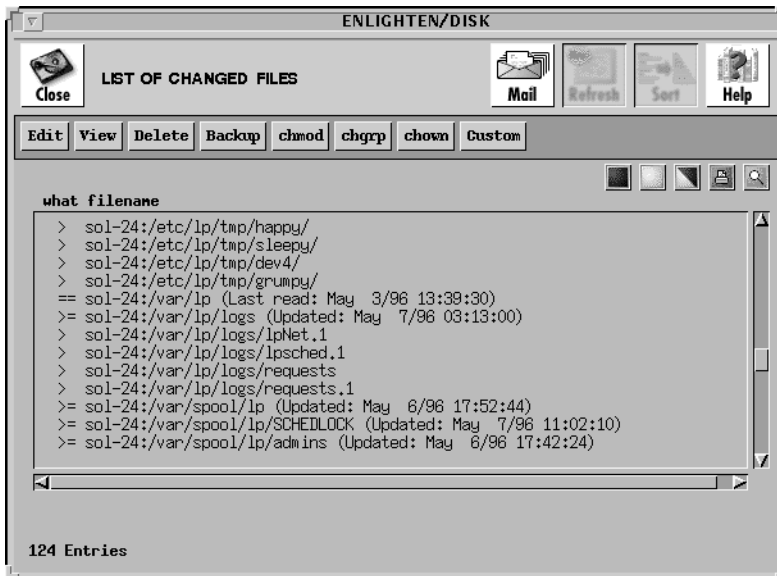
Figure 5-18 Changed Files

Type of Changes

This report is similar to that of previously described file lists, except an extra field is now included in the first column to describe the type of change that has occurred to the file.

☞   If you've set the File list format field in your Session Preferences window to the Long Listing option, the filename in this listing is annotated to describe the change itself. For details on how to set your session preferences, refer to .

The possible change types, their meanings, and the optional annotations (if the Long Listing option is set) are:

Code	Meaning	Annotation
>	New file	None
<	Lost file	None
>>	File increased in size	(*old size -> new size*)
<<	File decreased in size	(*old size -> new size*)
>=	File has been updated	(Updated: *date*)
==	File has been read	(Last read: *date*)
U	New user ownership	(*old owner-> new owner*)
G	New group ownership	(*old owner-> new owner*)
M	New mode (permissions)	(*old mode-> new mode*)
R	File has been renamed	(*old filename* is now *new filename*)

Mode changes (M) include changes to file permissions, setuid, setgid, and programs with the sticky bit turned on.

Buttons

Refer to for a detailed description of how to use the List of File Changes window buttons.

Search

Since many changes can occur to a partition over time, you may only want to look for specific types of changes. Click the Search button to define search criteria for the comparison you want to make. A window will appear providing a comprehensive set of search fields ().

Figure 5-19 Search Fields

The rest of this subsection describes how to use this window's fields and buttons.

General Fields

Find Filenames like

Use this field to specify filenames to use in the search pattern. The filenames can contain the standard UNIX wild card matching characters '*', '?', and '[ ]'. This field will accept more than one entry. Leave a blank space between each unique filename for multiple entries. This is a good mechanism to use if you only want to check for changes in a certain area of a partition.

Skip Filenames Like

This is the opposite of Find Filenames Like field. The filenames entered here create an exclusion list. Any filename entered here will NOT be matched by the search. This field uses the same format as the previous field. This is a good way to ignore files that change on a regular basis and omit unnecessary entries in the report.

Owner Names

Use this field to find only those files whose owners match the names of the users entered. This field will accept more than one entry. Leave a blank space between each unique owner for multiple entries.To exclude any files owned by certain users, place a ! before those usernames. For example:

root bin uucp	Only files belonging to users root, bin, or uucp
!root !bin	All files except those belonging to users root and bin

Group Names

This field is similar to the Owner Names field, except you can specify user group names to use (or exclude) instead of user names.

Min. File Size

Use this field to limit the search to files larger than a certain size. The default unit is bytes, but by appending one of the letters k, m, or g, the corresponding unit size of kilobytes (KB), megabytes (MB), or gigabytes (GB) will be used. This can be useful when you are looking for logfiles growing out of control.

Max. File Size

This field is similar to the Min. File Size field, except you can specify the maximum file size allowed in the search.

File Type Fields

New Files

Click the Yes button (the default) to search for new files that did not exist in the previously saved snapshot.

Include contents of new/lost dirs

When ENlighten/DSM searches for new or lost files and it comes across a new/lost directory, this selection determines if the contents of the new/lost directory should be included in the search. Click the Yes button (the default) if you want ENlighten/DSM to look at the complete contents of the new/lost directory in this case. Otherwise, click the No button to just put the name of the new/lost directory into any report results.

Lost Files

Click the Yes button (the default) to search for files that did exist in the previously saved snapshot and now no longer exist.

Attempt to determine renamed files

Sometimes, files are renamed. Normally this is considered to be the creation of a new file and the loss of the old one. Click the Yes button (the default) if you want ENlighten/DSM to attempt to determine if the file has been renamed or not.

This check is not foolproof; it will only find a file being renamed (moved) within the same directory in which it was originally found.

Altered Files

Click the Yes button (the default) to search for files that have changed since the previously saved snapshot. There are many different ways a file can change. These can be selected and/or limited by using the following fields. The default value for all of these fields is also set to Yes.

Type of Change Fields

Size

Use this file to search for files that have either increased or decreased in size and/or to search for changes within certain ranges. In the second case, you may enter the range of size changes that should be searched for in the corresponding Ranges field.

Each size range should be separated by a blank space. The range can be prefixed by a minus (-) sign to denote a decrease in the size or a plus (+) sign to denote an increase in size. If no sign is given, then an increase in size is assumed. A range has the following format:

```
[+/-]<minsize>[<unit>]-[<maxsize>[<unit>]]
```

The square brackets ([ ]) denote that the field is optional.
The fields are:

+	Search for files that have increased in size
-	Search for files that have decreased in size
`<minsize>`	The minimum size that file has changed in size
`<maxsize>`	The maximum size that file has changed in size
`<unit>`	The unit of size, with the possible units being:

B	Bytes
K	Kilo bytes
M	Mega bytes
G	Giga bytes
%	Relative increase in size in terms of per cent

The following are all valid range examples:

1000	File that increased in size by 1000 bytes
-2K	File that decreased in size by 2 Kb (2048 bytes)
10%	File that increased in size by 10 percent
100-10K	File that increased by 100 bytes but not more than 10 Kb
-10K-2M	File that decreased in size by 10Kb but not more than 2Mb

User Ownership

Click the Yes button to search for files that have changed user ownership. Sometimes you may want to focus on changes in ownership for just a few users or a specific group of users (e.g., chown to `root`). In this case, you can specify those entries in the corresponding Ranges field. Leave a blank space between each unique username or user ID (UID) for multiple entries.

Group Ownership

This field is similar to the User Ownership field, except you can specify user group names or group IDs (GIDs) to use instead of user names or user IDs (UIDs).

Mode

Click the Yes button to search for file permission changes. If you only want to look for specific mode changes (e.g., new setuid programs), you can specify those entries in the corresponding Ranges field. Leave a blank space between each set of mode changes for multiple entries.

You can use two formats to search for specific mode changes:

```
[+/-]<numeric mode>
[+/-]<who><modes>
```

Use the first format to search for added or lost permissions followed by UNIX style octal `<numeric mode>`. ENlighten/DSM will search for files that have had one of the specified bits changed in the file permissions, for example, use `+007` to look for any gaining of permissions for the *other* user type. Only experienced UNIX administrators should use this format.

Use the second format to search for where a type of user (`<who>`) and/or a type of mode (`<modes>`) permissions were added or lost.

The `<who>` permission values are:

u	Look for changes to the user's permissions
g	Look for changes to the group's permissions
o	Look for changes to the others' permissions
a	Look for changes to any of these permissions (user, group, and other). This is the default value.

The `<modes>` permission values are:

r	Look for changes to the read permissions
w	Look for changes to the write permissions
x	Look for changes to the execute permissions
s	Look for changes to the setuid permissions
t	Look for changes to the sticky bit permissions

The following are examples of the second format:

`+orwx`	Look for any gaining of permissions for *other* user types
`+s`	Look for any files gaining setuid/setgid privileges
`-ax`	Look for any loss of executable permissions for all user types

Updated

Updated files are files that have been modified without having the size of the file increase or decrease. This often happens to database files where data in the middle of the file is replaced with new data. Click the Yes button if updated files should be part of the search.

Accessed (read)

Every time a file/program is read or executed, the access date is updated. Since many files are typically read or executed between snapshots, the list of read files may become quite long. Click the No button if read files should not be included in the search.

Buttons

Execute Search

The search criteria may use one or any combination of the fields described in the previous section. Once you've entered your search criteria, click the Execute Search button. The List of Changed Files window will appear with a list of the files that met the criteria (<u>Figure 5-20</u>).
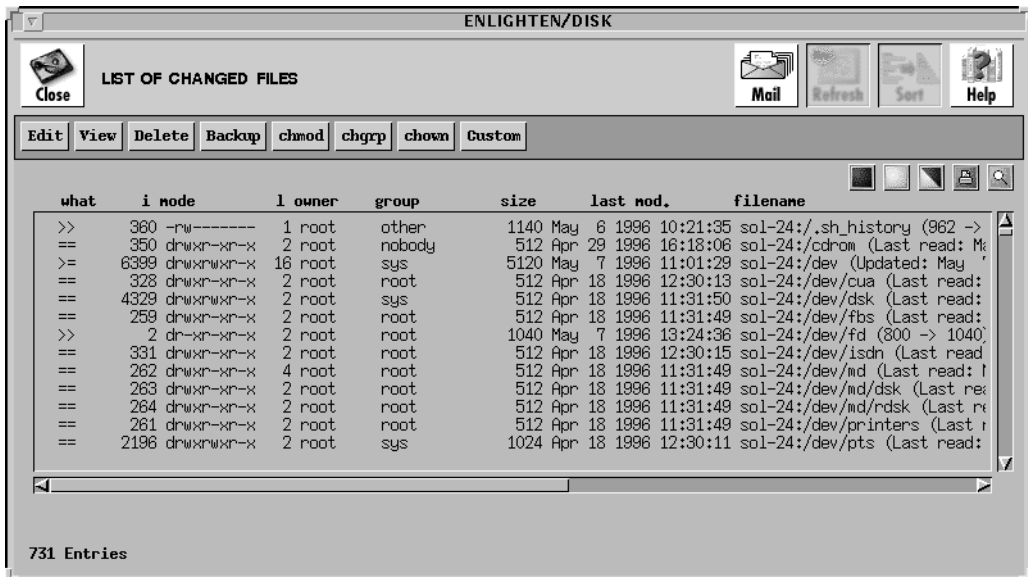
Figure 5-20 List of Changed Files window

As mentioned previously, disk snapshot comparisons are time-intensive operations that may take time to complete.

From here, you can execute more commands such as edit, backup, and chown to manipulate the displayed files' characteristics. See "File List" on page 5-33 for more details on using this window and "View Files" on page 5-9 to use its buttons.

Clear Fields

Click this button to clear the existing choices in all fields.

Close

Click this button to discard any changes and close the window.

NFS

There are two sides to Network File System (NFS) management: the client side where filesystems are mounted or unmounted on a given host, and the server side where directories are made available for export by a host. You can use this module to handle both sides. The actual options are:

- Mounted Directories
- Exported Directories

The rest of this section details how to use these options.

Mounted Directories

Use this menu item to view a list of all currently mounted NFS partitions (directories), along with any unmounted directories slated for mounting at boot time. Figure 5-21 shows the mounted filesystems on all hosts in the current pool.
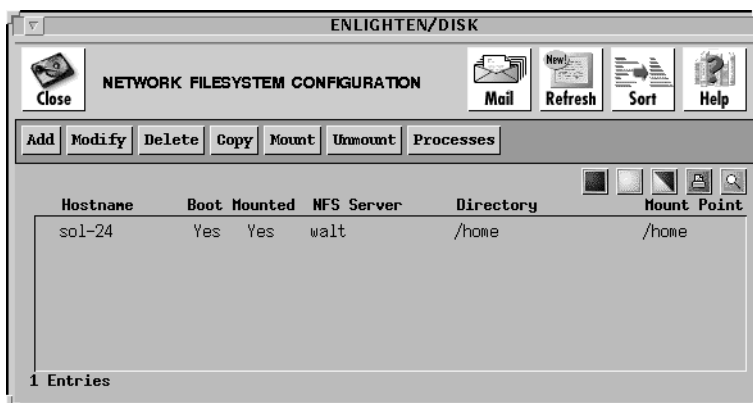

Figure 5-21 Mounted Filesystems on Hosts of the Current Pool

Each line in the list box will display the hostname, whether the filesystem is currently mounted and/or automatically mounted at boot time, the NFS Server name, the remote partition (directory) name, and the local mount point name.

You may select one or more filesystems for further processing by highlighting the desired NFS partition. Now you can perform the following operations to further manipulate your choice(s):

- Add   Add an NFS partition on one or more hosts

- Modify   Modify the mount parameters for an existing NFS configuration

- Delete   Remove the marked networked directories from the Network Filesystem Configuration list

- Copy   Copy the selected mount parameters and create a new partition to be mounted

- Mount   Mount an NFS partition immediately

- Unmount   Unmount the marked NFS partition(s)

- Processes   View the processes for the marked filesystem(s)

Add

Use this command to add an NFS partition on one or more hosts. You can mount this partition immediately, at boot time, or both. Click the Add button to bring up the Add an NFS Partition window (<u>Figure 5-22</u>).
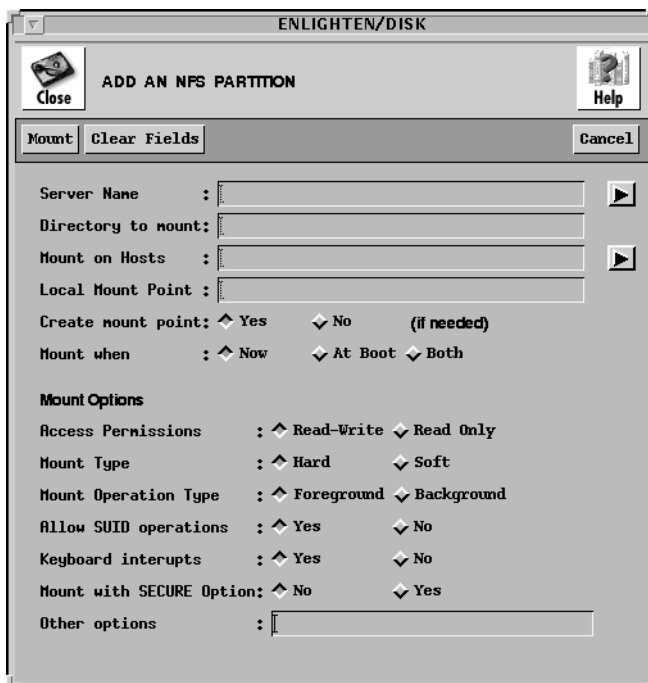
Figure 5-22 The NFS Partition window

Add Fields

This window has the following fields:

Server Name

Use this field to specify the NFS server from which the partition will be mounted. You can also click the arrow button to the right to pop up a pick list of all hosts within the current pool that may have partitions that you can mount.

Directory to mount

Use this field to specify the remote directory to be mounted. Leave a blank space between directory names for multiple entries.

Mount on Hosts

Use this field to specify the hosts where the directory will be mounted. Leave a blank space between host names for multiple entries. You can also click the arrow button to the right to pop up a pick list of all hosts within the current pool that may mount the partition specified above and make your selection(s) from there.

Local Mount Point

Use this field to specify the directory name where the exported partition will be mounted.

Create mount point

Use this toggle to specify if the local mount point directory should be created during a mount if that directory does not already exist. The default is Yes.

Mount when

Use these toggles to specify when the mount should take place. The options are Now (the default), On Reboot, or Both.

Access Permissions

Use this toggle to specify how the remote partition should be mounted: Read-Write (the default) or Read Only.

Mount Type

Use this toggle to specify if the mount should be a Hard (the default) or Soft mount. Filesystems that are mounted read-write or that contain executable files should be mounted with the hard setting. Applications using soft-mounted filesystems may produce unexpected I/O errors. Soft-mounted filesystems return errors on request; hard-mounted filesystems display a warning message and continue to try the request.

Mount Operation Type

Use this toggle to specify whether the mount should be performed in the Foreground (the default) or Background.

Allow SUID operations

Use this toggle to specify if setuid execution is allowed for this mount, but silently ignores requests to set the SUID bit.

Keyboard interrupts

Use this toggle to specify if keyboard interrupts are allowed to kill a process that is hung up while waiting for a response on a hard-mounted filesystem. The default is Yes.

Mount with Secure Option

Use this toggle to specify whether to mount with the authentication of RPCoption. The default is No.

Other options

You can use this field to specify other NFS options. This field is not prechecked for syntax errors.

Add Buttons

This window has the following buttons:

Mount

Click this button to initiate the mount defined in the window.

Clear Fields

Click this button to clear the existing choices in all fields.

Cancel

Click this button to close the window without making any changes.

Modify

Click the Modify button to modify the mount parameters for an existing NFS configuration. You can do so only if the partition is mounted automatically at boot time (see the list box entry).

The Modify An NFS Partition window is similar to the Add An NFS Partition window, except you cannot modify the Server Name, Directory to mount, or Mounted on Host fields.

There are also two button differences in the Modify window:

- You can use the Modify button (rather than the Add button) after you've made all your changes, and

- You can use the Next button to modify additional NFS partitions if you've selected more than one to modify from the Network Filesystem Configuration list.

For a description of the rest of the buttons and fields in this window, see .

Delete

Click the Delete button to remove directories from the Network Filesystem Configuration list. ENlighten/DSM will prompt you to confirm your action.

Copy

Use this command to copy the selected mount parameters and create a new partition to be mounted. Select the desired partition and click the Copy button. The Add An NFS Partition window will appear showing the highlighted partition's settings in each of the fields.

You can edit this window as needed and then click the Mount button to initiate the new mount defined in the window.

See "Add" on page 5-44 for a description of how to use this window's fields and buttons.

Mount

Click this button to mount an NFS partition immediately. The Mount An NFS Partition window will appear. This window is similar to the Add An NFS Partition window, except you do not have a Mount when field here.

For a description of the buttons and fields in this window, see "Add" on page 5-44.

Unmount

Click this button to unmount the highlighted NFS partition(s).
A pop-up window will appear asking you to confirm this action.

Processes

Click this button to bring up the Processes by Filesystem window. Only processes being run on the selected mounted partitions will be displayed. You can use this option to view any processes before forcefully unmounting a filesystem.

See "Processes by Filesystem" on page 5-24 for details on how to use the Processes by Filesystem window and its buttons.

☞ The Processes By Filesystem functionality does not work correctly in version 4.1x of the Sun operating system. The resulting report may be incomplete and/or display processes that are NOT associated with the selected partitions.

Exported Directories

Use this menu item to view a list of all directories available for export and/or export one or more of them. The window shown in Figure 5-23 will appear, displaying the exportable directories on all hosts in the current pool.
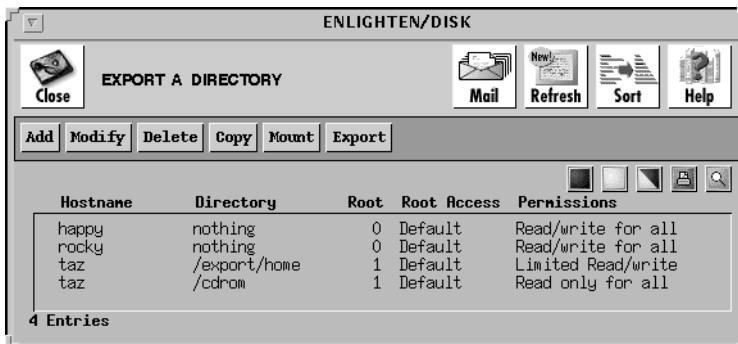

Figure 5-23 Exportable Directories

Each line in the list will display the hostname, exported partition, root access, and permissions. You may select one or more partitions for further processing by highlighting it and using the following operations to further manipulate your choice(s):

- Add   Make a directory exportable and export it

- Modify   Modify the export parameters for an existing NFS partition

- Delete   Remove the marked directory from the Export a Directory list

- Copy   Copy the selected export parameters and create a new exportable directory

- Mount   Mount an NFS partition immediately

- Export   Re-export the selected directory

Add

Use this command to define a new export criterion for a directory. Click the Add button to bring up the Export a Filesystem window (Figure 5-24).
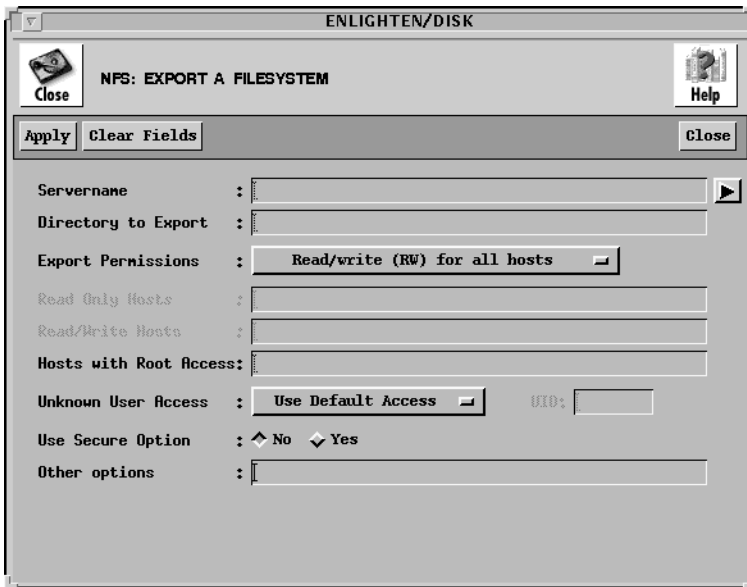

Figure 5-24 Export a Filesystem window

Add Fields

This window has the following fields:

ServerName

Use this field to specify the NFS server from which the partition will be mounted. You can also click the arrow button to the right to pop up a pick list of all hosts within the current pool.

Directory to Export

Use this field to specify the full pathname for the directory to export. Leave a blank space between directory names for multiple entries.

Export Permissions

Use these toggles to specify what access permissions the client machines will have to the directory. The options are:

- Read/write (RW) for all hosts (the default)
- Read only (RO) for all hosts
- RW for specific hosts and RO for rest
- Read/write for specific hosts
- Read only for specific hosts

Read Only Hosts

This field is active only if you selected the Read only for specific hosts option in the Export Permissions field. Use this field to specify the read only hosts. Leave a blank space between hostnames for multiple entries.

Read/Write Hosts

This field is active only if you selected RW for specific hosts and RO for rest or Read/write for specific hosts options in the Export Permissions field. Use this field to specify the read/write hosts. Leave a blank space between hostnames for multiple entries.

Hosts with Root Access

Use this field to specify which hosts have root equivalency permissions on this partition. Leave a blank space between hostnames for multiple entries.

Unknown User Access

Use these toggles to determine how unknown user (UID) access should be handled. This will also determine how any root access (other than those hosts specified in the previous Hosts with Root Access field) should be handled. The options are to:

- Use Default Access (the default). UID_NOBODY if it is unknown.
- Disable Unknown Access. -1 access is denied.
- Select own UID. Only specified UID has access.

UID

This field is active only if you selected the Select own UID option in the Unknown User Access field. Use this field to enter a UID to which unknown users will be mapped.

Use Secure Option

Use this toggle to specify if the filesystem should be exported with the Secure option. The default is No.

☞ This does not work on all systems (e.g., SCO and HP). Both the server and the client must be configured to be "secure" for this to work properly.

Other options

You can use this field to specify other NFS options. This field is not prechecked for syntax errors.

Add Buttons

This window has the following buttons:

Apply

Click this button to export the directory.

Clear Fields

Click this button to clear the existing choices in all fields.

Close

Click this button to discard any changes and close the window.

Modify

Click the Modify button to modify the export parameters for an existing NFS partition. The Modify An Exported Filesystem window is similar to the Export a Filesystem window, except you can not modify the Servername or Directory to Export fields.

There are also two button differences in the Modify window:

- You can use the Modify button (rather than the Add button) after you've made all your changes, and

- You can use the Next button to modify additional NFS partitions if you've selected more than one to modify from the Network Filesystem Configuration list.

For a description of the rest of the buttons and fields in this window, see "Add" on page 5-52.

Delete

Click the Delete button to remove directories from the Export a Directory list. ENlighten/DSM will prompt you to confirm your action.

Copy

Use this command to copy the selected export parameters and create a new exportable directory. Select the desired directory and click the Copy button. The Export a Filesystem window will appear showing the highlighted export definition.

You can edit this window as needed and then click the Apply button to create the new export definition.

See "Add" on page 5-52 for a description of how to use this window's fields and buttons.

Mount

Click the Mount button to mount an NFS partition immediately. The Mount An NFS Partition window will appear, as detailed in the section "Mount" on page 5-49. The window's fields will already be initialized based on the exported directory's permissions.

For a description of the buttons and fields in this window, see "Add" on page 5-44.

Export

Click the Export button to immediately re-export the highlighted directories. A pop-up window will appear asking you to confirm this action.