

Logtool Utility

External Reference Specification

Support Tool Manager (STM)
Hewlett-Packard

Revision 1.17

10/07/98



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1. Product Identification

1.1. Product Name

This project is known internally as STM. This document describes the external specifications for the LOGTOOL utility.

1.2. Document Change History

Revision 1.00 - 4/15/94	First Publication
Revision 1.1 - 4/19/94	Numerous changes made to reflect the evolving design of STM logging. Added appendices with formats of each log entry type and the logger configuration file.
Revision 1.2 - 8/16/94	Added a feature to enable users to invoke a specified program to be invoked to process specific entries that are received by the Logger process.
Revision 1.3 - 3/27/95	Updated filter fields to reflect changes in the product fields available in the map. Basically, the product and description fields have been merged so the description filter field was eliminated.
Revision 1.4 - 11/7/95	Updated filter fields for program to be invoked for specific entries.
Revision 1.5 - 11/10/95	Updated diagrams for new log types, header entries and header entry values.
Revision 1.6 - 11/14/95	More updates to header structures. Removed all mention of STM Formatter.
Revision 1.7 - 11/16/95	More updates to the diaglogd configuration file. Added hversion to lpmc entry type.
Revision 1.8 - 04/30/97	Replaced figures with actual screen pictures. Updated text to match new pictures where appropriate. Added information regarding memory menu command selections.
Revision 1.9 - 06/20/97	Changed Logtool's Main Window figure

- Revision 1.10- 07/21/97 Made changes to incorporate selection of current raw log file as default. Made changes where appropriate for logtool “shortcut” commands. (Introduced in Logtool Version 2.0.)
- Revision 1.11– 10/29/97 Reformatted to make document suitable for HP customers.
- Revision 1.12– 11/26/97 Made changes to incorporate multiple file selection capability. (Introduced in Logtool Version 3.0.)
- Revision 1.13- 02/12/98 Modified Filter dialog screens to incorporate the capability to filter on a range of entries in the log file (Introduced in Logtool Version 5.0.)
- Revision 1.14- 04/15/98 Modified Select Raw and Select Formatted dialog screens to show new file size/date/time information. Modified Filter dialog screens with changes to entry type filter selections. (Introduced in Logtool Version 5.10).
- Revision 1.15- 08/05/98 Modified View and Summary screens with changes to button selections. These changes are not directly tied to a Logtool Version.
- Revision 1.16- 08/26/98 Modified Filter dialog screens and View Log screens with changes for entry id number. (Introduced in Logtool Version 6.0).
- Revision 1.17- 10/07/98 Modified Appendix A to reflect addition of Entry Index to log entry structures. (Introduced in Logtool Version 6.0 for Event Notification).

1.3. Overview

STM utility programs are one of the eight architected types of support tools. They are designed to provide various services that do not fall under the scope of the other types of support tools. Unlike the other support tool types, utility programs such as this one are not device specific and do not require selection of a device to run.

2. Functional Overview

2.1. Tool Strategy

Logtool is an interactive utility that runs on the STM platform, providing users with access to the system log files. Logtool has four main command categories: File, View, Filters and Memory. The File commands allow the user to select log files, switch log files, or exit (i.e., quit) Logtool. The View commands display summary data on selected log files or the contents of the logs. The Filters commands enable the user to set up formatting and display filters that can be used to specify exactly what type of entries the user is interested in. The Memory commands allow the user to recreate and /or view the contents of the memory log file and to set the interval for polling for memory errors.

2.1.1. Assumptions

It is not currently anticipated that Logtool will need to log information of its own into its Tool Activity Log. However, if errors are encountered by Logtool or the STM service routines that it calls, error information may be written to this log to assist in debugging. The type of errors that may be encountered and the corresponding log information is not known at this time.

This specification addresses the logging strategy that is used on HP-UX systems. If STM is ported to other operating systems, the logging strategy is likely to be somewhat different than what is described in this document.

2.1.2. External Dependencies

Logtool is a log formatting display utility. The actual formatting of a raw log file into a displaceable format is done in part by Logtool and in part by decode routines at the request of Logtool, as will be discussed later.

2.1.3. Implementation Specific Errors and Corresponding Actions

It is not possible for this specification to address all of the potential conditions which could arise in the course of any operating system running this utility. Therefore, it is expected that the implementor of this utility will be responsible for anticipating and addressing any implementation specific errors and/or actions not identified in this specification.

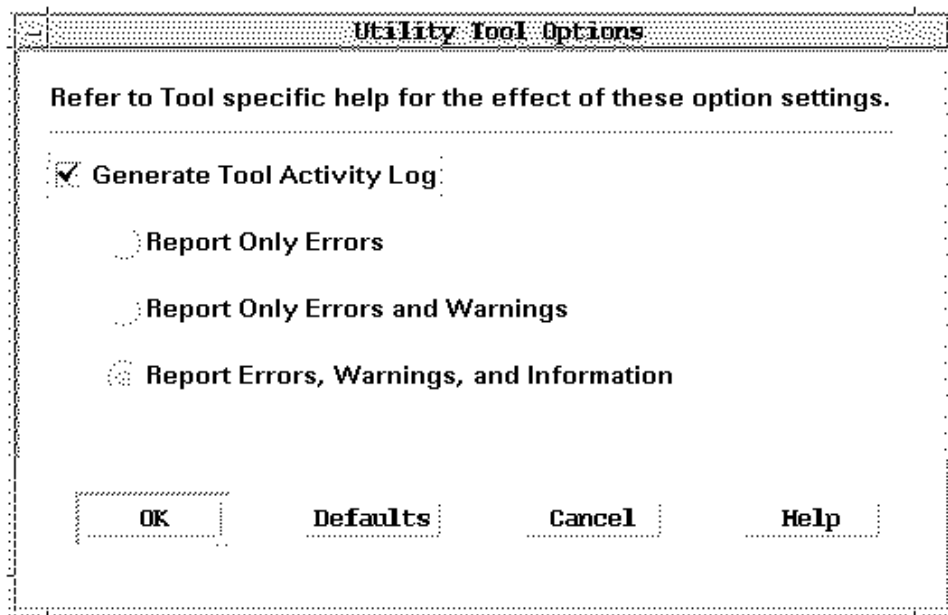
2.2. Operational Overview

Utilities are invoked via the *Utilities* sub-menu under the *Tools* menu in the STM User Interface. Selection of this command will cause a cascade menu to be displayed with the names of all of the utility programs that are currently installed. The user should select the "Logtool" entry to invoke this tool.

2.3. User Perspectives

2.3.1. Utility Options

The figure below shows the options that are available for utilities. These options can be changed via the *Tool Options* sub-menu of the *Options* menu in the STM User Interface. The only option that is available for utilities is that which controls the type of information that is logged to the Tool Activity Log.

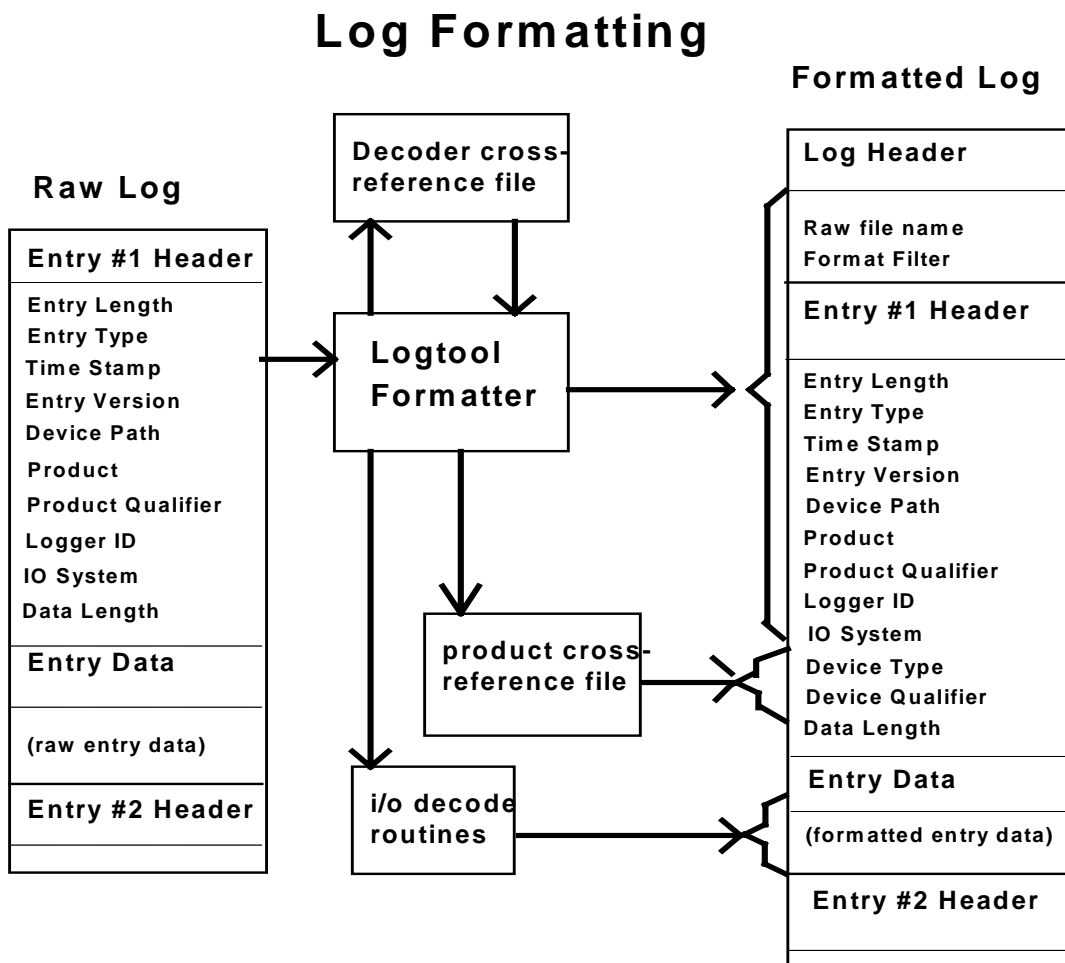


2.4. STM Logging Strategy

Log data is maintained on the system in raw form (e.g., Raw Log in the following figure) which consists of a header for each entry that is generated by the logging process followed by the raw data supplied by the driver or other logging entity. In order to display the data in text understandable to most users, the contents of the raw log must be formatted and placed into a formatted log. The formatted data for each

entry consists of a header that is generated by Logtool and a series of language localized message descriptors that are generated by log decoding programs associated with each logging entity (e.g. i/o driver) or entry type (e.g. lpmc entry). The contents of the formatted log can then be displayed to the user by retrieving message text from catalogs associated with each message specifier and displaying it. If no decoding routine is installed for a particular logging entity, Logtool will provide only the header information for entries associated with it and a hex display of the raw data for those entries.

The following figure shows an example of how a raw log file whose first entry is an I/O error is formatted. Refer to Appendix A for the contents of other entry types.

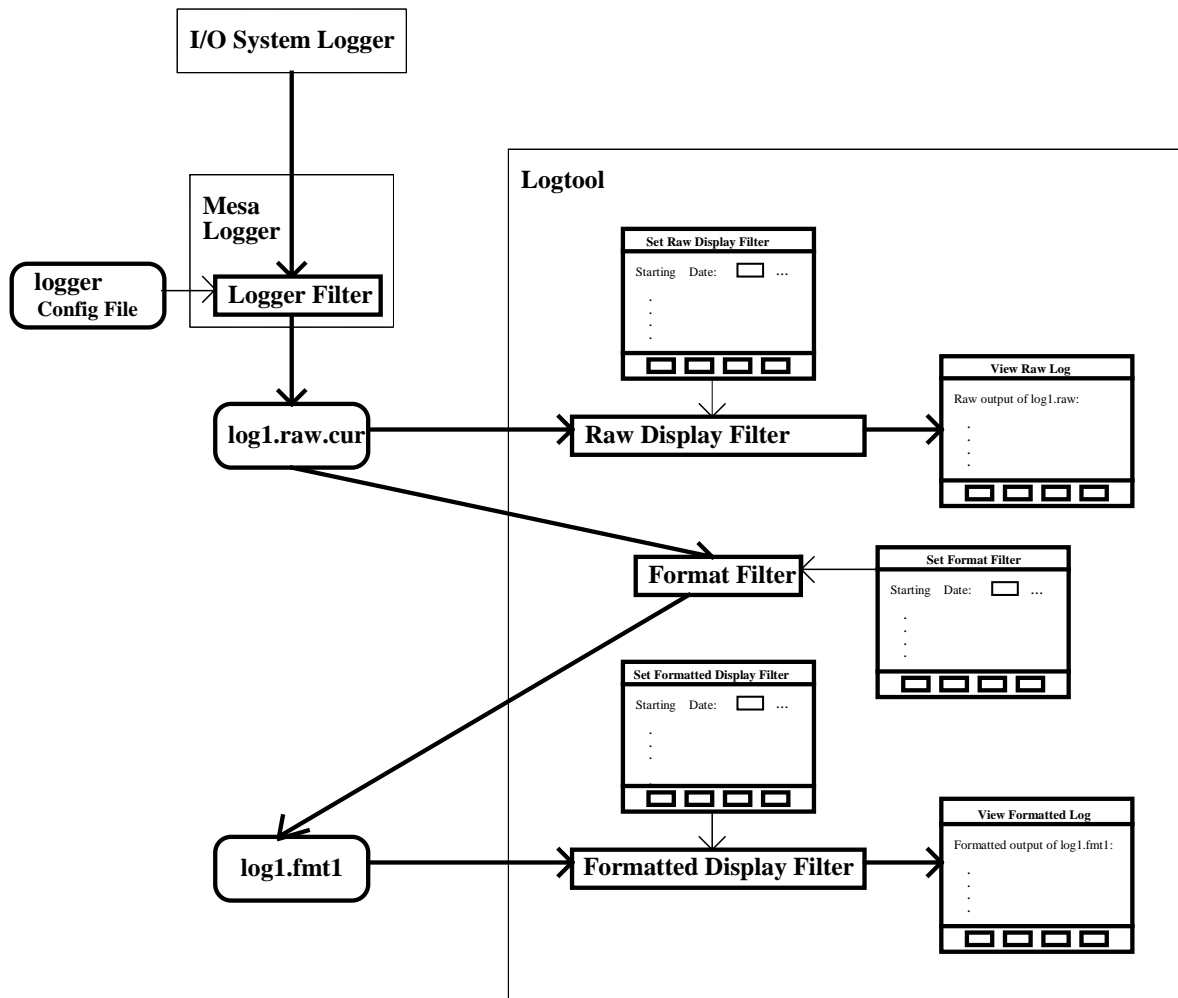


Logtool provides commands to view either the raw log file data (in hex), or the formatted output (in text).

Since it is possible for there to be a large amount of data in a given log file or series of log files, Logtool gives the user a set of formatting and display filters that enable the user to select only those log entries that are of interest for formatting or viewing. The formatting filter is used to selectively **format** only raw entries that the user is interested in and the display filters are used to selectively **display** the formatted or raw entries that the user is interested in.

For example, a user could specify that only log entries for disk drives should be formatted which would result in a formatted log file containing only disk entries. Later, when displaying the entries, the user might decide to display only entries for Hard disks, or only disks on a certain path, etc.

The following diagram outlines the general flow of data between the STM logger, log files and Logtool. The thick solid arrows in the diagram represent data flows and the thin solid arrows show how the various filters are generated. The dashed boxes represent processes or logical blocks of code. For example, the Logtool box and the STM Logger box represent separate processes.



In addition to the various filters implemented by Logtool, the STM Logger process also has the capability to filter log data based on certain criteria. This enables the user to "turn off" logging of entries that are of no interest. Entries that are filtered out via the logger process are discarded and not placed in the raw log file, thus saving disk space. This filter can be modified by editing the logger configuration file.

The Logger process also enables the user to invoke specific programs when particular entries are logged. The program that is invoked will be passed the raw log entry on which it will presumably do some special case processing. An example of a practical application of this feature could be to monitor log entries from a particular device and generate messages to the system console if critical errors are detected. It should be noted that the Logger process will log the entry as usual after passing it to the specified program. The user can specify which programs to invoke for which log entries in the logger configuration file.

Refer to Appendix B for details on the logger configuration file.

2.5. Log File Naming Conventions

Raw log files have names of the form *logn.raw*, where *n* is a number that starts at one and is incremented each time a new log file is created via the *Switch Log* command. The exception to this is the log file to which the logger is currently logging which is called *logn.raw.cur*. Formatted log files have names of the form *logn.fmtm* where the first number matches that of the raw log file from which it was generated and the second number starts at one and is incremented by one for each new formatted file that is generated from the same raw log file. In the case where multiple files were selected to be formatted together, the filename will have a plus sign, "+", in it. For example, *log1.raw* and *log2.raw* would be formatted in to the file *log1+.fmt1*.

On HP-UX systems, the default directory of the system log files is */var/stm/logs/os*. Formatted log files will be stored in the same directory by default. The memory log file, *memlog*, is also located in the */var/stm/logs/os* directory.

2.6. Log Entry Types

The actual contents of the I/O error logs is system dependent. The logs currently contain the following types of entries:

- I/O Errors (logged by drivers)
- LPMC
- System Overtemp
- LVM Errors (logged by LVM system)
- Logger Events

Although the examples in this document focus on I/O error entries, which are expected to be the most prevalent, the principles of each example apply to the other entry types as well.

2.7. Operational Overview

All of the Logtool commands can be invoked via: a GUI interface, a menu interface, or a command line interface. In all cases, the user is presented with four categories of commands. The user selects the appropriate command depending upon the desired operation. The examples in this ERS use the X-Windows GUI interface. All of the functionality presented is available in the menu and command line interfaces as well.

3. User Interface

Logtool commands allow the user to easily search a computer system's I/O and memory error log files. The User Interface is designed with usability as a foremost concern which means it strives to be as intuitive as possible while also providing as much capability as possible.

3.1. Logtool Commands

In an effort to keep Logtool simple for the user, only four command categories (called menus) exist. The following table shows the four categories of Logtool commands arranged as one menu per column.

File	View	Filters	Memory
Select Raw...	Raw Summary	Format...	Clear Log
Format Raw...	Raw Log	Display-->	Set Timer...
Select Formatted...	Formatted Summary		Report Log-->
Switch Log	Formatted Log		
Save As...			
Print...			
Exit...			

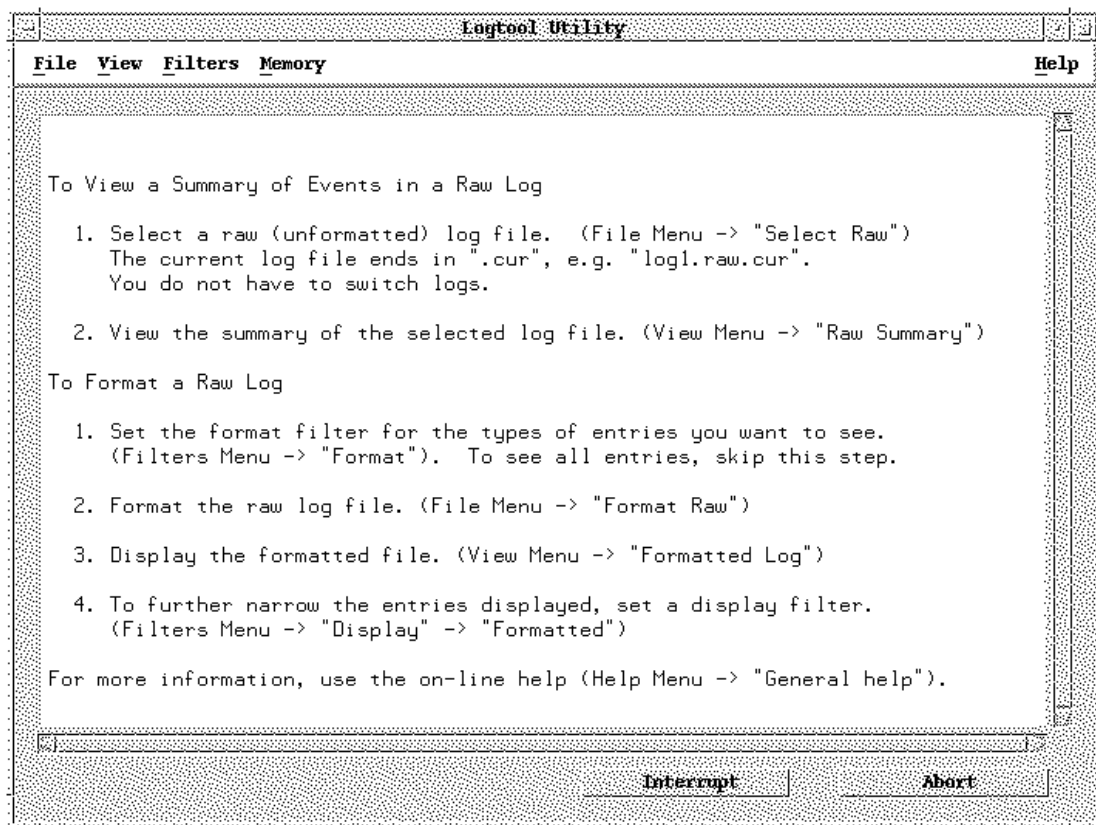
In the above table, note that some commands have an ellipse (...) after them. This signifies that if one of these commands is selected, a dialog screen of some type will be presented before anything is actually done. For example, if *Select Raw* is chosen, the user will be asked for the raw file name before a file is actually selected. Also note that some commands have an arrow next to them, indicating that there is more than one command to choose from. These commands are available via a cascade menu. The commands available in each cascade menu are shown in the following tables:

Display
Raw...
Formatted...

Report Log
View Dealloc
View Detail

3.2. Logtool Main Window

When Logtool is first invoked from the *Utility* menu of the STM User Interface, the main command window is displayed. This window contains a set of command menus through which the user selects operations for Logtool to perform. The contents of these menus were discussed in the previous section. This screen also provides a scrolling information area where Logtool can display informational messages to the user. The following sample screen shows the main command window.



3.3. Typical Logtool Usage

A typical Logtool session could consist of the following activities:

- View a summary of a raw log file on the system and determine if any entries have been logged that are of interest.
- If the raw log summary indicates that there are some entries of interest:
 - Set up a format filter which will filter out all entries except for those of interest.
 - Format the raw log file(s).
 - Display the formatted log file.

Once a formatted log file has been generated, the user may wish to further narrow the entries that are displayed. This can be done by setting the formatted display filter to the appropriate values prior to displaying the log. For example, the user may have used a format filter to format all entries from the SCSI disk driver. After viewing a summary of the formatted entries, the user may decide that only entries for a particular device or, perhaps, only entries after a certain date and time are of interest. The user could then set the formatted display filter to specify a specific device path and/or date and time and view the formatted log.

The commands used in these examples, as well as other Logtool commands, are all discussed in detail in the following section.

4. Detailed Command Descriptions

4.1. Commands within the *File* Menu

4.1.1. Select Raw

This command displays the names of the raw log files that are currently on the system and allows the user to select one or more of them for viewing, filtering or formatting. The initial file filter is set to the default location and naming convention for raw log files and the default file selection defaults to the current raw logfile, if there is one. Users can access the default file, specify a file from the files list presented, or they can specify a file of their own choosing. In this case, caution should be exercised since only log files that were generated on the host system should be formatted on that system. Attempts to format log files from other systems may result in formatting problems or incorrect formatted output. Once a formatted log is generated, it may be moved to other systems and displayed without any problems.

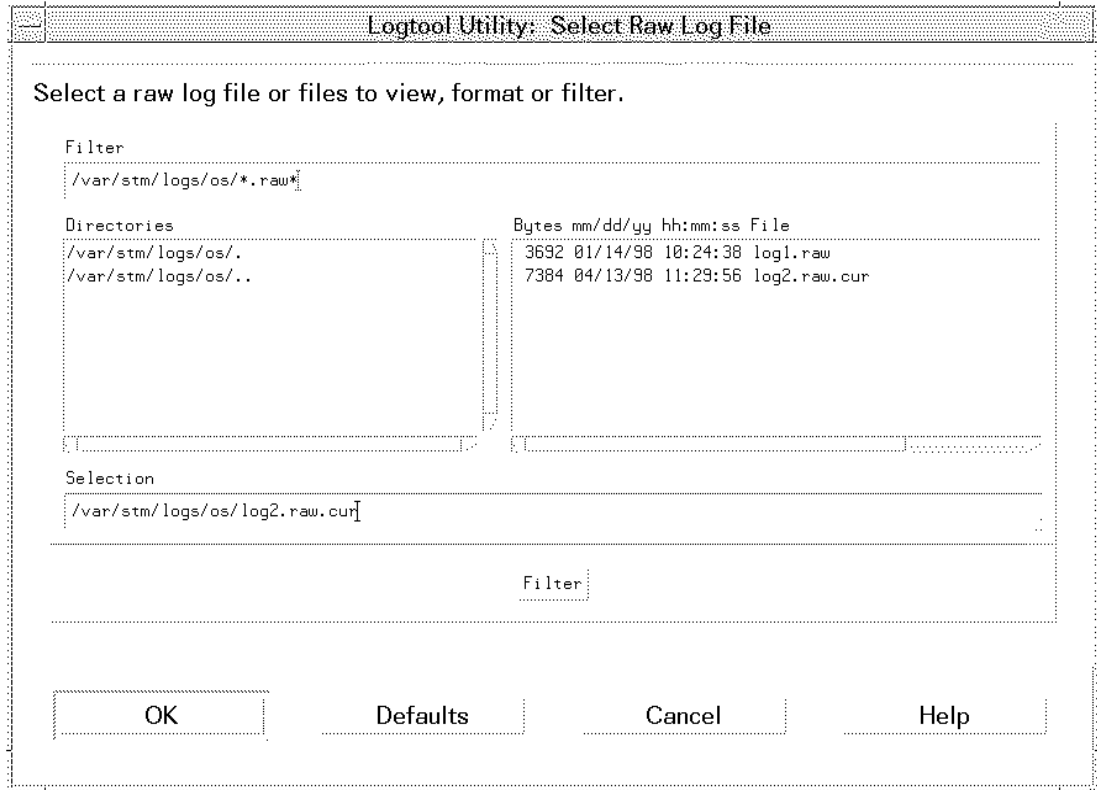
When a raw log file is selected, it is automatically read and summarized by Logtool, which may cause a short delay if the file is large or several files have been selected. The summary data reflects totals of all log entries from all selected files integrated together and treated as one file. This summary information is then automatically displayed to the user. The summary can be displayed independently at any time via the *Raw Summary* command under the *View* menu. This summary information is used by Logtool to determine appropriate values for fields that can be set in the raw display filter as well as in the format filter. If the log file to which the logger is currently logging, *logn.raw.cur*, is selected, the output of subsequent commands such as the *Raw Log* command under the *View* menu or the *Format Raw* command under the *File* menu may reflect additional records and/or counts that weren't displayed initially. This is because more errors may have been logged to the currently active file since it was initially selected and read.

The following figure shows the screen that is displayed in the GUI when the *Select Raw* command is selected. Note the current raw log file in this example is shown as *log2.raw.cur*. If desired, users can enter a new file filter in the *Filter* box and click on the *Filter* button when done. The new filter will then be applied and a list of files that match will be displayed.

Users can change directories by simply clicking on the directories listed in the *Directories* box. Once the correct directory has been selected, a file is selected by clicking on its name in the *Files* box and clicking the *OK* button at the bottom of the screen.

If the user wishes to exit this command without selecting a file, the *Cancel* button which will take the user back to the main menu screen should be selected.

Clicking on the *Help* button will provide help on how to perform a file selection.



4.1.2. Format Raw

This command is used to format any raw log files that were previously selected via the *Select Raw* command under the *File* menu. If no files were selected, the current raw log file, if there is one, is used as the default. Depending on how much data is in the selected files, the *Format Raw* command may take several minutes to complete. If more than one file was selected, all the log entries from all the files will be formatted on a per-file basis and concatenated in one continuous flow into one formatted file.

The entries in the raw log will first be filtered according to any *Format* filter settings. If no filters have been selected, all entries will be formatted. Refer to the *Filters* Menu Section for more information. Entries which do not match the filter will not be formatted. If the user wishes to format entries which were previously filtered out, the filter should be changed and the log reformatted.

The header portion of each entry is architected and will be interpreted and formatted into text by Logtool. The data portion of each entry is not architected and will be interpreted and formatted into text by the appropriate log decoding routine. If an appropriate log decoding program cannot be located for a particular entry, the data portion of the entry will be formatted for display in hex by Logtool.

The output file name is selected automatically based on the raw log file name. The raw log file *log1.raw* becomes *log1.fmt_n* where *n* is incremented every time a format is done on *log1.raw*. This file naming convention for formatted log files allows the user to generate several different formatted versions of a raw log file, all presumably generated using different filters, and easily tell from which raw log file they were generated. For example, *log1.fmt1* and *log1.fmt2* were both formatted from the same raw log file *--log1.raw*. In the case where multiple files were selected to be formatted together, the filename will have a plus sign, "+", in it. For example, *log1.raw* and *log2.raw* would be formatted into the file *log1+.fmt1*.

When the *OK* button is selected, the user then selects a directory into which to place the formatted log file. The default log directory is supplied. The format process is then invoked and once the format process is complete, the filename where the output was placed will be displayed in Logtool's main window. Once formatting is complete the formatted log summary is automatically displayed. The formatted file automatically becomes the selected formatted file that will be displayed or summarized by the *Formatted Summary* and *Formatted Log* commands under the *View* menu. See the following figures for samples of the dialog screens presented during the *Format Raw* process.

Logtool Utility: Format Raw Log File

Select a directory into which to place the formatted file:

Filter
/var/stm/logs/os/

Directories
/var/stm/logs/os/.
/var/stm/logs/os/..

Selection
/var/stm/logs/os/

Filter

OK **Defaults** **Cancel** **Help**

4.1.3. Select Formatted

This command displays the names of the formatted log files that are currently in the default log directory on the system and allows the user to select one or more of them for viewing or filtering. The initial filter will be set to the default location for formatted log files. Users can specify a file from the files list presented or they can optionally specify a file of their own choosing.

When a formatted log file is selected, it is automatically read and summarized by Logtool, which may cause a short delay if the file is large or several files have been selected. The summary data reflects totals of all log entries from all selected files, integrated together and treated as one file. This summary information is then automatically displayed to the user. The summary can be displayed independently at any time via the *Formatted Summary* command under the *View* menu. This summary information is used by Logtool to determine appropriate values for fields that can be set in the *Display-->Formatted* filter. Refer to the *Filters* menu for more information.

The following figure shows the screen that is displayed in the GUI when the *Select Formatted* command is selected. In this example *log1.fmt1* has been selected. Users can enter a new file filter, if desired, in the *Filter* box and click on the *Filter* button when done. The new filter will then be applied and a list of files that match will be displayed.

Users can change directories by simply clicking on the directories listed in the *Directories* box. Once the correct directory has been selected, the user selects a file by clicking on its name in the *Files* box and clicking the *OK* button at the bottom of the screen.

If the user wishes to exit this command without selecting a file, the *Cancel* button should be selected which will take the user back to the main menu screen.

Clicking on the *Help* button will provide help on how to perform a file selection.

Logtool Utility: Select Formatted Log File

Select a formatted log file or files to view or filter:

Filter
/var/stm/logs/os/*.fmt*

Directories	Bytes	mm/dd/yy	hh:mm:ss	File
/var/stm/logs/os/.	32680	03/02/98	16:48:13	log1.fmt1
/var/stm/logs/os/..				

Selection
/var/stm/logs/os/log1.fmt

Filter

OK Defaults Cancel Help

4.1.4. Switch Log

This command causes the STM logger to open a new current log file. It may be desirable to issue this command occasionally in order to keep individual log files from becoming larger than what is desirable. The new log file that is created by the logger process will be named according to the standard naming convention with the number incremented by one. Thus, if the current log file is called *log5.raw.cur*, the new one will be called *log6.raw.cur* and the old one will be renamed to *log5.raw* to signify that it is no longer current.

This command is provided as a convenience to the user. The user can accomplish a switch log manually by simply renaming the current log file. When the logger process notices that there is no *logn.raw.cur* file present, it will create a new one. Thus, to accomplish the same thing as the above *Switch Log* example, the user could have issued the system command "mv log5.raw.cur log5.raw".

4.1.5. Save As

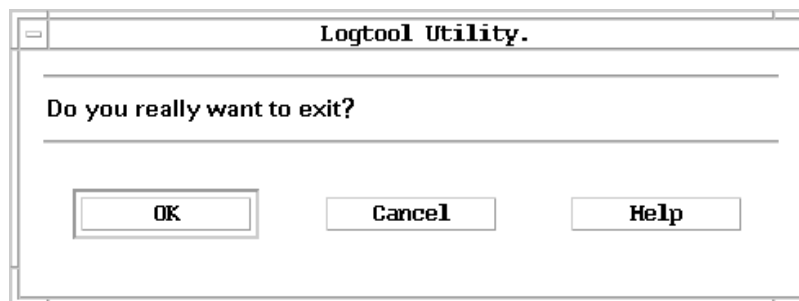
This command is used to save the contents of Logtool's main window. Only the most recent 200 lines can be saved. The user is presented with a dialog box in which they can specify their desired filename.

4.1.6. Print

This command is used to print the contents of Logtool's main window. Only the most recent 200 lines can be printed.

4.1.7. Exit

This command exits Logtool. The user is asked to confirm that they want to exit, as is shown in the dialog box figure that follows.



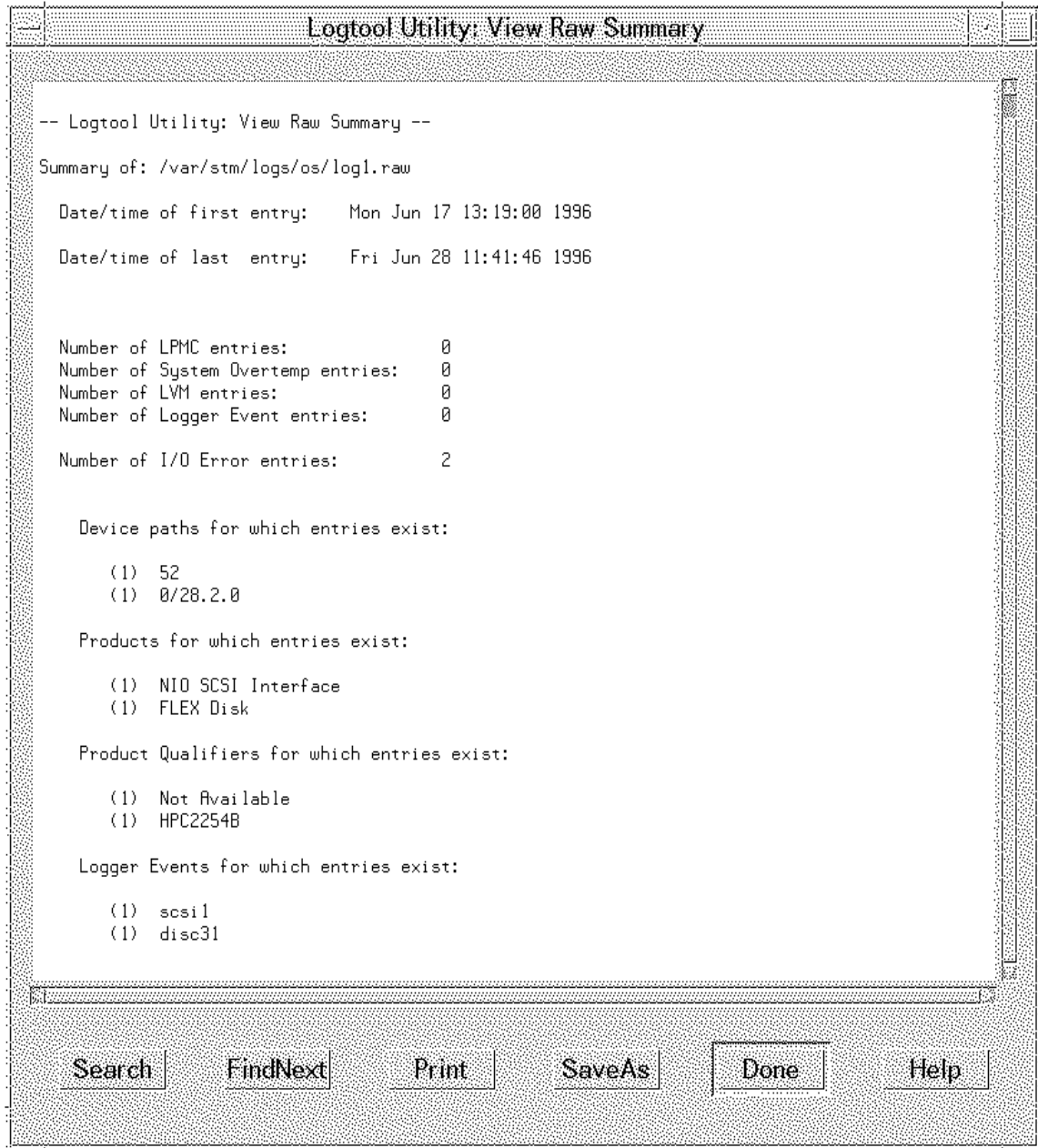
4.2. Commands within the View Menu

4.2.1. Raw Summary

This command displays a summary of the currently selected raw log file or files. If a file was not selected via the *Select Raw* command under the *File* menu, then the current raw log file, if there is one, is used as the default. The summary is a report of the total number of each entry type that occurs in the file. In the case of I/O error entries there is a unique list of device paths, products, product qualifiers and logger events and the count shown for the number of times each occurs in the file is shown in parentheses. The summary data reflects totals of all log entries from all selected files, integrated together and treated as one file. This summary information is the same information that is used in the *Format* command under the *Filters* menu and the *Raw* command under the *Filters-->Display* menu to specify exactly what subset of entries should be formatted via the *Format Raw* command under the *File* menu. Refer to those commands for more details.

The following figure shows the screen that is displayed in the GUI when this command is selected. Note that information is only given for entries that are actually in the log file. Thus, there was one lvm error and two I/O errors in this log file. The I/O errors were generated on two different device paths, by two different products with two different product qualifiers and two different loggers.

In this screen, the user has the option to scroll through the summary information using the scroll bar at the right, perform a case-sensitive search (*Search* and *FindNext*), print the information to a printer (*Print*), save the information to a file (*SaveAs*), close the window (*Done*) or ask for help (*Help*).



4.2.2. Raw Log

This command displays the contents of all the raw log files selected with the *Select Raw* command under the *File* menu. If no files were selected, the current raw log file, if there is one, is used as the default. Each entry consists of a header and data. The header content is architected for all entries. The format of the data portion is not architected and is under complete control of the logging entity (e.g. I/O drivers). The header portion of the entry is interpreted and displayed in text. The data portion of the entry is not interpreted and is displayed in hex.

The entries in the raw log file are first filtered according to the *Raw* filter under the *Filters --> Display* menu. Entries which do not match the filter will not be displayed. If no filters were selected, all entries are displayed. The entries are processed on a per-file basis, concatenated in a continuous flow and treated as one file when displayed. If the user wishes to display entries which were previously filtered out, the filter should be changed and the log redisplayed.

The following figure shows the screen that is displayed in the GUI when the *Raw Log* command is selected. In this example, only the first entry is shown. To see the remaining entries, the user can use the scroll bar on the right of the screen to scroll through the text, perform a case-sensitive search (*Search* and *FindNext*), move from log entry to log entry (*Prev* and *Next*), print the information to a printer (*Print*), save the information to a file (*SaveAs*), close the window (*Done*) or ask for help (*Help*). Note also in this example that the Display Filter information shows the starting and ending dates which were in force when the file was filtered. These dates will match the date/time of the first and last entry and will only change if the user selects date criteria on the filter display screens. Any other filters that were specified will also be displayed here. In this example no filter criteria was specified.

Logtool Utility: View Raw Log

-- Logtool Utility: View Raw Log --

Raw Output of: /var/stm/logs/os/log1.raw

Date/time of first entry: Mon Jun 17 13:19:00 1996

Date/time of last entry: Fri Jun 28 11:41:46 1996

Display Filters:

Starting Date: Mon Jun 17 13:19:00 1996

Ending Date: Fri Jun 28 11:41:46 1996

=====
Entry Type: I/O Error
Entry logged on Mon Jun 17 13:19:00 1996
Entry id: 0x31c5bdb400000000

Device Path: 0/28.2.0
Product: FLEX Disk
Product Qualifier: HPC2254B
Logger: disc31

Entry Data:

	0	1	2	3	4	5	6	7	8	9	ASCII
00000000:	00	00	00	00	00	00	00	00	00	00	.....
00000010:	00	00	fc	00	04	17	01	00	12	00	.....
00000020:	00	00	04	17	04	17	00	00	00	00	.....
00000030:	00	00	02	00	05	00	00	00	00	02	.....
00000040:	20	0d	00	00	00	00	00	00	00	00	.....
00000050:	00	00	00	00	00	00	00	00	00	00	.....
00000060:	00	00	21	cc	04	2b	00	00	00	00	..!..+....
00000070:	00	00	04	01	79	48	00	00	00	00	...yH....
00000080:	01	05	02	02	00	00	00	40	fe	2a	.....0.*
00000090:	00	00	00	00	00	00					.....

=====
Entry Type: I/O Error
Entry logged on Fri Jun 28 11:41:46 1996
Entry id: 0x31d4276a00000000

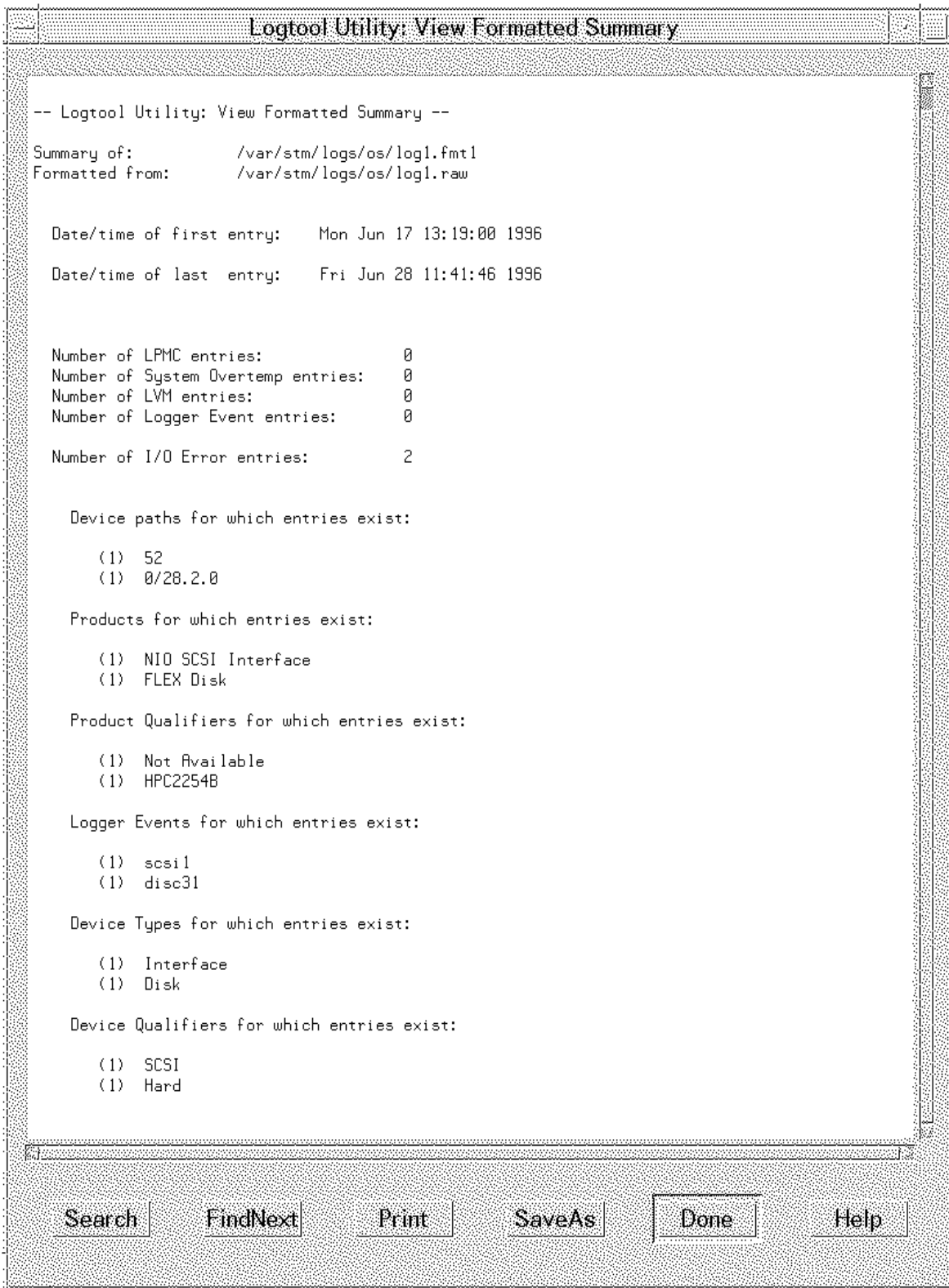
Search FindNext Prev Next Print SaveAs Done Help

4.2.3. Formatted Summary

This command displays a summary of the currently selected formatted log file or files. If a file was not selected via the *Select Formatted* command under the *File* menu, then the current raw log file, if there is one, is used as the default. The summary is a report of the total number of each entry type that occurs in the file. In the case of I/O error entries there is a unique list of device paths, products, product qualifiers, logger events, device types and device qualifiers and the count shown for the number of times each occurs in the file is shown in parentheses. The summary data reflects totals of all log entries from all selected files, integrated together and treated as one file. This summary information is the same information that is used in the *Formatted* command under the *Filters --> Display* menu to specify exactly what subset of entries should be displayed via the *Formatted Log* command under the *View* menu. Refer to those commands for more details.

The following figure shows the screen that is displayed in the GUI when the *Formatted Summary* command is selected. Note that information is only given for entries that are actually in the log file. The information in this example represents what the output might look like if the raw log file shown in the previous example was formatted without filtering out any entries. As mentioned above, the numbers that appear in parentheses (nn) give the count of the number of occurrences of the various items in the log file.

In this screen, the user has the option to scroll through the summary information using the scroll bar at the right, perform a case-sensitive search (*Search* and *FindNext*), print the information to a printer (*Print*), save the information to a file (*SaveAs*), close the window (*Done*) or ask for help (*Help*).



4.2.4. Formatted Log

This command displays the formatted log data that was generated by the *Format Raw* command under the *File* menu. If a file was not selected via the *Select Formatted* command under the *File* menu, then the current raw log file, if there is one, is used as the default. This default file is then automatically formatted and that formatted log is displayed. If more than one file was selected, the entries from all the files are processed on a per-file basis and concatenated in one continuous flow before being displayed.

The entries in the formatted log file will first be filtered according to the *Formatted* settings under the *Filters --> Display* menu. Entries which do not match the filter will not be displayed. If the user wishes to display entries which were previously filtered out, the filter should be changed and the log redisplayed.

The following figure shows the screen that is displayed in the GUI when the *Formatted Log* command is selected. In this example, only part of the first entry is shown. To see the remaining entries, the user can use the scroll bar on the right of the screen to scroll through the text, perform a case-sensitive search (*Search* and *Find Next*), move from log entry to log entry (*Prev* and *Next*), print the information to a printer (*Print*), save the information to a file (*SaveAs*), close the window (*Done*) or ask for help (*Help*).

The header information in this example indicates that when the raw log was formatted, no format filters were in force other than the default starting and ending entry dates. If the user wants to see specific entries, the *Format* filter under the *Filters* menu should be changed and the raw log file should be reformatted via the *Format Raw* command under the *File* menu.

Logtool Utility: View Formatted Log

-- Logtool Utility: View Formatted Log --

Formatted Output of: /var/stm/logs/os/log1.fmt2
Formatted from: /var/stm/logs/os/log1.raw

Date/time of first entry: Mon Jun 17 13:19:00 1996
Date/time of last entry: Fri Jun 28 11:41:46 1996

Display Filters:

Starting Date: Mon Jun 17 13:19:00 1996
Ending Date: Fri Jun 28 11:41:46 1996

Entry Type: I/O Error
Entry logged on Mon Jun 17 13:19:00 1996
Entry id: 0x31c5bdb400000000

Device Path: 0/28.2.0
Product: FLEX Disk
Product Qualifier: HPC2254B
Logger: disc31
Device Type: Disk
Device Qualifier: Hard

I/O Log Event Information:

I/O Event Class - Software Triggered Event
I/O Transaction Number - 0x00000000
Length of Hardware Status Logged - 0 bytes
Length of Driver Information Logged - 18 bytes
I/O retry information:
All retries are being logged, and this retry of the I/O FAILED.
0 retries have been performed so far. I/O will NOT be retried again.

Low Level I/O (LLIO) Status: 0xfc000417
Subsystem field = "disc31"; Proc. Num. = 0; Error Num. = -4
Error: The requested operation can not be understood by the I/O driver.
The request message, whole or part, is junk.

Hardware Status:
Unknown Status message returned. Status message bytes are (hex):
(0)=13 (1)=41 (2)=2E (3)=30 (4)=00 (5)=00

Search FindNext Prev Next Print SaveAs Done Help

4.3. Commands within the *Filters* Menu

4.3.1. Format

This command is used to select the filter that will be used by Logtool to select which entries in the selected raw log file(s) to format. In order to set the filter, the user should first select a raw log file or files via the *Select Raw* command under the *File* menu. If a file was not selected in this way then the current raw log file, if there is one, is used as the default. Once a raw log file has been selected, it is automatically summarized and only the items which actually occur in the log file will be displayed as selections for filtering. These items will be displayed in a dialog screen and the user can select as many items as desired. If more than one file was selected, all the log entries from all the files will be integrated together and treated as one file.

Once one or more items has been selected, subsequent *Format Raw* commands (under the *File* menu) will only format entries which match the filter criteria. An entry is considered to be a match for a particular filter field if it matches any of the selected items that were set in that field. If a field has no items selected, any entry will match that field. In order for an entry to pass through the filter, it must match the criteria for all of the filter fields.

For example, if the user selects a product of *Flex Disk* and a product qualifier of *HPC2254B*, only entries for HPC2254B Flex Disks will be formatted/displayed. If the user selects a device path of 52 and a product of *Flex Disk*, no entries will be formatted/displayed if there is not a disk drive associated with path 52. If the user selects paths 52 and 0/28.2.0 and does not select items in any of the other filter fields, all entries for paths 52 and 0/28.2.0 will be formatted/displayed.

The starting and ending date/time fields will initially contain the date/time of the first and last log entries. All log entries which are logged on or after the starting date/time and on or before the ending date/time will be formatted. The user can modify either or both of these fields as desired.

The following figure shows the screen that is displayed in the GUI when the *Format* command is selected. The figure is in two separate boxes for documentation purposes only. The GUI displays the screen in one box with scroll bars available if needed. The user can select various filter items and then click on the OK button to return to the main menu. If the user wishes to exit without changing the filter settings, the *Cancel* button should be used. The *Defaults* button will undo any changes that have been selected.

Below is what the top portion of the Set Format Filter dialog screen looks like:

Logtool Utility: Set Format Filter

Date and time of first log entry: Mon Jun 17 13:19:00 1996

Date and time of last log entry: Fri Jun 28 11:41:46 1996

Format entries logged within the following dates/times:

Starting Date and Time:
Time (hh:mm:ss) [13 : 19 : 00] Month [06] Day [17] Year [1996]

Ending Date and Time:
Time (hh:mm:ss) [11 : 41 : 46] Month [06] Day [28] Year [1996]

Lowest Entry id : 0x31c5bdb400000000
Highest Entry id: 0x31d4276a00000000

Display entries with entry ids within the following range:

Starting entry id (hex) : [31c5bdb400000000]
Ending entry id (hex) : [31d4276a00000000]

Total Entries: 2

Display entries within the following range:

Starting Entry Number: [1]
Ending Entry Number : [2]

Display entries of the following types:

- Low Priority Machine Check
- System Overtemp
- LVM
- Log Suspend and Resume

[OK] [Defaults] [Cancel] [Help]

Below is what the bottom portion of the Set Format Filter dialog screen looks like:

Logtool Utility: Set Format Filter

I/O Error Entries:

All I/O Errors

No I/O Errors

Filter I/O Errors (qualifier choices below)

Device Path:

52
0/28.2.0

Products:

NIO SCSI Interface
FLEX Disk

Product Qualifiers:

Not Available
HPC2254B

Loggers:

scsi1
disc31

OK Defaults Cancel Help

4.3.2. Display --> Raw

This command is used to select the filter criteria that will be used by Logtool to select which entries in the raw log file to display. In order to set the filter, the user should first select a raw log file or files via the *Select Raw* command under the *File* menu. If a file was not selected in this way then the current raw log file, if there is one, is used as the default. Once a raw log file has been selected, it is automatically summarized and only the items which actually occur in the log will be displayed as selections for filtering. These items will be displayed in a dialog screen and the user can select as many items as desired. If more than one file was selected, all the entries from all the files will be integrated together and treated as one file.

Once one or more items has been selected, subsequent *Raw Log* commands under the *View* menu will only display entries which match the filter criteria. An entry is considered to be a match for a particular filter field if it matches any of the selected items that were set in that field. If more than one item in a field is selected, any entry must only match one of the items. If a field has no items selected, any entry will match that field. In order for an entry to pass through the filter, it must match the criteria for all of the filter fields.

The starting and ending date/time fields will initially contain the date/time of the first and last log entries. All log entries which are logged on or after the starting date/time and on or before the ending date/time will be displayed. The user can modify either or both of these fields as desired.

In addition to providing filtering on each of the header fields, the user may want to enter a specific hex pattern to search for which can be used to further narrow the entries to the exact ones that are of interest. If a search pattern is specified, it will be applied in addition to any other fields that have been specified, but only to the data portion of each entry. Thus, for a raw display operation, one could search for the occurrence of a specific hex pattern using this facility. The user is cautioned that specifying a search pattern may result in a noticeable delay because each entry must be converted to its hex display and the search pattern applied. When a search pattern is not used, entries whose header contents do not pass the filter are not converted to their hex display in order to save time.

The following figure shows the screen that is displayed in the GUI when this command is selected. The figure is in two separate boxes for documentation purposes only. The GUI displays the screen in one box with scroll bars available if needed. The user can select various filter items and then click on the OK button to return to the main menu. If the user wishes to exit without changing the filter settings, the *Cancel* button should be used. The *Defaults* button will undo any changes that have been selected.

Below is what the top portion of the Set Raw Display Filter dialog screen looks like:

Logtool Utility: Set Raw Display Filter

Date and time of first log entry: Mon Jun 17 13:19:00 1996

Date and time of last log entry: Fri Jun 28 11:41:46 1996

Display entries logged within the following dates/times:

Starting Date and Time:

Time (hh:mm:ss) 13 : 19 : 00 Month 06 Day 17 Year 1996

Ending Date and Time:

Time (hh:mm:ss) 11 : 41 : 46 Month 06 Day 28 Year 1996

Lowest Entry id : 0x31c5bdb400000000

Highest Entry id: 0x31d4276a00000000

Display entries with entry ids within the following range:

Starting entry id (hex): 31c5bdb400000000

Ending entry id (hex) : 31d4276a00000000

Total Entries: 2

Display entries within the following range:

Starting Entry Number: 1

Ending Entry Number : 2

Display entries which have text matching the following hex pattern
(applies to data portion of entries only):

Hex pattern (40 char max):

OK Defaults Cancel Help

Below is what the bottom portion of the Select Raw Filters dialog screen looks like:

Logtool Utility: Set Raw Display Filter

Display entries of the following types:

- Low Priority Machine Check
- System Overtemp
- LVM
- Log Suspend and Resume

I/O Error Entries:

- All I/O Errors
- No I/O Errors
- Filter I/O Errors (qualifier choices below)

Device Path:

52
0/28.2.0

Products:

NIO SCSI Interface
FLEX Disk

Product Qualifiers:

Not Available
HPC2254B

Loggers:

scsil
disc31

OK Defaults Cancel Help

4.3.3. Display --> Formatted

This command is used to select the filter criteria that will be used by Logtool to select which entries in the formatted log file to display. In order to set the filter, there must be a currently active selected formatted file. This means that the user should have first selected a formatted log file or files via the *Select Formatted* command under the *File* menu; or have performed the *Select Raw* and *Format Raw* commands under the *File* menu. If a file was not selected in one of these ways, then the current raw log file, if there is one, is used as the default. This file is then automatically formatted and that formatted log is then selected. Once a formatted log file has been selected, it is automatically summarized and only the items which actually occur in the log will be displayed as candidates for filtering. These items will be displayed in a dialog screen and the user can select as many items as desired. If more than one file was selected, all the entries from all the files will be integrated together and treated as one file.

Once one or more items has been selected, subsequent *Formatted Log* commands under the *View* menu will only display entries which match the filter criteria. An entry is considered to be a match for a particular filter field if it matches any of the selected items that were set in that field. If more than one item in a field is selected, any entry must only match one of the items. If a field has no items selected, any entry will match that field. In order for an entry to pass through the filter, it must match the criteria for all of the filter fields.

The starting and ending date/time fields will initially contain the date/time of the first and last log entries. All log entries which are logged on or after the starting date/time and on or before the ending date/time will be displayed. The user can modify either or both of these fields as desired.

The following figure shows the screen that is displayed in the GUI when this command is selected. The figure is in two separate boxes for documentation purposes only. The GUI displays the screen in one box with scroll bars available if needed. The user can select various filter items and then click on the OK button to return to the main menu. If the user wishes to exit without changing the filter settings, the *Cancel* button should be used. The *Defaults* button will undo any changes that have been selected.

Below is what the top portion of the Set Formatted Display Filter dialog screen looks like:

Logtool Utility: Set Formatted Display Filter

Date and time of first log entry: Mon Jun 17 13:19:00 1996

Date and time of last log entry: Fri Jun 28 11:41:46 1996

Display entries logged within the following dates/times:

Starting Date and Time:

Time (hh:mm:ss) [13] : [19] : [00] Month [06] Day [17] Year [1996]

Ending Date and Time:

Time (hh:mm:ss) [11] : [41] : [46] Month [06] Day [28] Year [1996]

Lowest Entry id : 0x31c5bdb400000000

Highest Entry id: 0x31d4276a00000000

Display entries with entry ids within the following range:

Starting entry id (hex): [31c5bdb400000000]

Ending entry id (hex) : [31d4276a00000000]

Total Entries: 2

Display entries within the following range:

Starting Entry Number: [1]

Ending Entry Number : [2]

Display entries of the following types:

- Low Priority Machine Check
- System Overtemp
- LVM
- Log Suspend and Resume

OK Defaults Cancel Help

Below is what the bottom portion of the Set Formatted Display Filter dialog screen looks like:

Logtool Utility: Set Formatted Display Filter

I/O Error Entries:

All I/O Errors

No I/O Errors

Filter I/O Errors (qualifier choices below)

Device Path:

52
0/28.2.0

Products:

NIO SCSI Interface
FLEX Disk

Product Qualifiers:

Not Available
HPC2254B

Loggers:

scsil
disc31

Device Types:

Interface
Disk

Device Qualifiers:

SCSI
Hard

OK Defaults Cancel Help

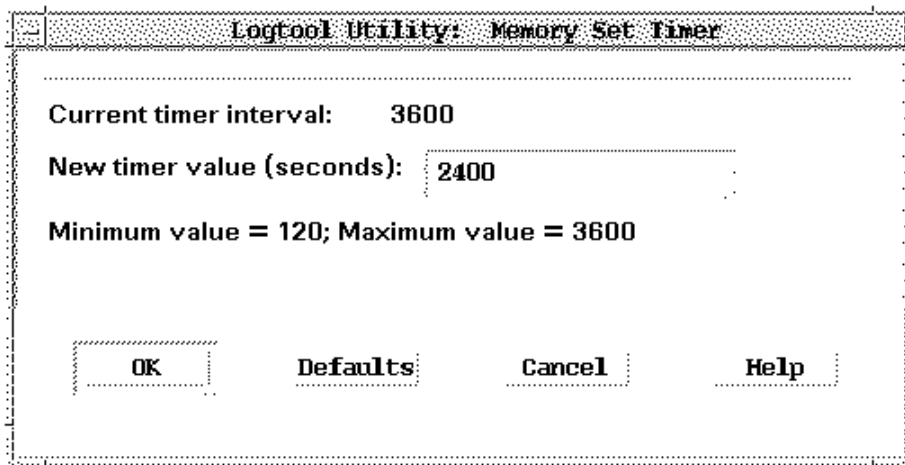
4.4. Commands within the *Memory* Menu

4.4.1. Clear Log

This command allows the user to clear the memory log file. The user is cautioned that performing this operation will result in the loss of any data that was in the memory log file. It is recommended that the user run the *Memory Log-->Detail* command to verify that any data in the file is no longer needed.

4.4.2. Set Timer

This command allows the user to change the interval at which the memory logging daemon polls the memory for errors. The figure below shows the screen that is presented to the user.

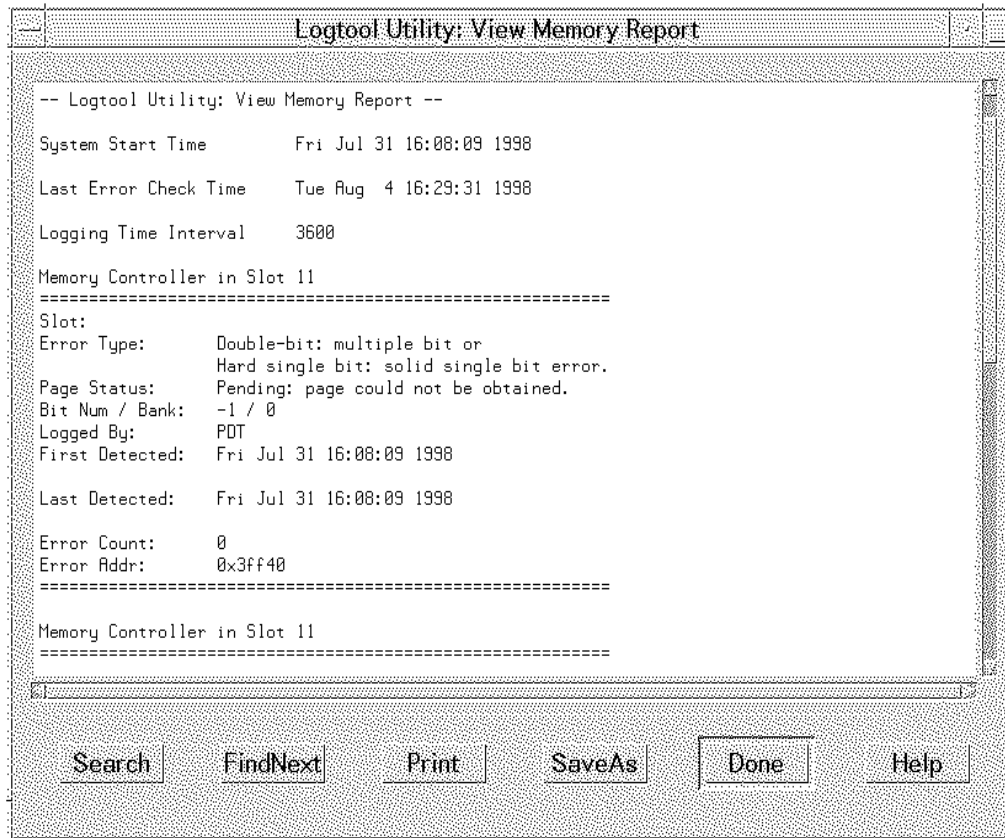
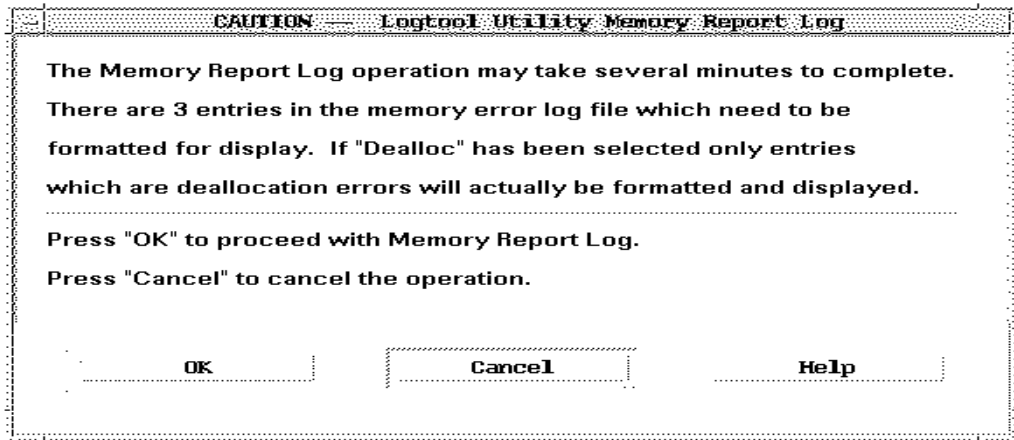


4.4.3. Report Log-->View Dealloc

This command allows the user to view the deallocated page information from the memory error log file. The memory log file will be formatted and then displayed to the user. Depending on how many entries are in the file, this may take a few minutes. A dialog box is displayed to the user telling them how many entries are in the file. At this point they may either cancel the operation or continue with the format and display of the file. See the example dialog box and memory log report figures that follow.

4.4.4. Report Log-->View Detail

This command allows the user to view the entire contents of the memory error log file. The memory log file will be formatted and then displayed to the user. Depending on how many entries are in the file, this may take a few minutes. A dialog box is displayed to the user telling them how many entries are in the file. At this point they may either cancel the operation or continue with the format and display of the file. The figures below show the dialog box and a sample memory error log file showing one entry.



Appendix A - Log Entry Formats

There are several architected log entry formats that Logtool handles. For each entry, there is a header portion that is architected. Additionally, each entry has a data portion which is not architected. Logtool processes, formats, and displays the header fields and decoding programs are used to handle the data portion. This strategy strikes a balance between flexibility and usability in that Logtool can use the header information for summarizing and filtering log entries but does not need to know the details of the data portion. Thus, to change or enhance the data that is logged, all that is required is changing the appropriate decoding program. The only instance in which Logtool itself would need to change is if a new type of log entry is introduced or a change in the header information of one or more entries is required.

The structure of each type of log entry is shown in the figure below. Following the diagram, a brief description is provided.

I/O Error Entry (Entry Type = 1)	LPMC Entry (Entry Type = 2)	System Overtemp Entry (Entry Type = 3)	LVM Entry (Entry Type = 4)	Logger Entry (Entry Type = 5)
Header:	Header:	Header:	Header:	Header:
Entry Length	Entry Length	Entry Length	Entry Length	Entry Length
Entry Type	Entry Type	Entry Type	Entry Type	Entry Type
Entry Index	Entry Index	Entry Index	Entry Index	Entry Index
Entry Version	Entry Version	Entry Version	Entry Version	Entry Version
Time Stamp	Time Stamp	Time Stamp	Time Stamp	Time Stamp
Device Path	Hversion	Data Length	Data Length	Data Length
Product	Data Length	Data:	Data:	Data:
Product Qual	Data:	.	.	.
Logger ID	.	.	.	.
Data Length	.	.	.	.
Data:	.			
.				
.				
.				

I/O Error Entry

I/O error entries are logged by I/O system drivers and typically contain information concerning exception conditions that the driver encountered. The header for this entry contains the following fields:

Entry Length	The total length of the entry including the header.
Entry Type	The type of entry. The value for I/O error entries is 1.
Entry Index	The entry index is used in combination with the entry time stamp to build the entry ID for this error event.
Entry Version	The entry version indicates the version of the header for the type of log entry this is.
Time Stamp	The date/time that the logger process logged this entry.
Device Path	The device path of the hardware module that is being controlled by the driver which is logging. If NULL, the driver is not associated with any physical hardware module.
Product ID	The product identifier associated with the hardware module. This identifier will be extracted from the system configuration map entry corresponding to the Device Path above. If Device Path is NULL, this field will be NULL also.
Logger ID	The unique identifier of the driver that is logging this entry. The decoder cross-reference file will be searched for a logger id that matches this one. If an entry is found, the associated decoder or monitor module will be invoked to decode the data portion of this entry when the log is formatted. If no decoder cross-reference entry is found, the entry will be formatted and displayed in hex.
Data Length	The total length of the data portion of this entry.

LPMC Entry

This entry is logged by the system when a low priority machine check condition occurs. The header for this entry contains the following fields:

Entry Length	The total length of the entry including the header.
Entry Type	The type of entry. The value for LPMC entries is 2.

Entry Index	The entry index is used in combination with the entry time stamp to build the entry ID for this error event.
Entry Version	The entry version indicates the version of the header for the type of log entry this is.
Time Stamp	The date/time that the logger process logged this entry.
Hversion	Hversion of the main processor.
Data Length	The total length of the data portion of this entry.

System Overtemp Entry

This entry is logged by the system when an overtemp condition occurs. The header for this entry contains the following fields:

Entry Length	The total length of the entry including the header.
Entry Type	The type of entry. The value for system overtemp entries is 3.
Entry Index	The entry index is used in combination with the entry time stamp to build the entry id for this error event.
Entry Version	The entry version indicates the version of the header for the type of log entry this is.
Time Stamp	The date/time that the logger process logged this entry.
Data Length	The total length of the data portion of this entry.

LVM Entry

This entry is logged by the Logical Volume Manager and typically contain information concerning exception conditions that the manager encountered. The header for this entry contains the following fields:

Entry Length	The total length of the entry including the header.
Entry Type	The type of entry. The value for LVM entries is 4.
Entry Index	The entry index is used in combination with the entry time stamp to build the entry ID for this error event.

Entry Version	The entry version indicates the version of the header for the type of log entry this is.
Time Stamp	The date/time that the logger process logged this entry.
Data Length	The total length of the data portion of this entry.

Logger Entry

This entry is logged by the logger process. The type of events that are logged via this entry are things such as suspension of logging due to user request or because the error rate of disk space thresholds were exceeded, and resumption of logging. Other types of events may be added in the future as warranted. The header for this entry contains the following fields:

Entry Length	The total length of the entry including the header.
Entry Type	The type of entry. The value for logger entries is 5.
Entry Index	The entry index is used in combination with the entry time stamp to build the entry ID for this error event.
Entry Version	The entry version indicates the version of the header for the type of log entry this is.
Time Stamp	The date/time that the logger process logged this entry.
Data Length	The total length of the data portion of this entry.

Appendix B - Logger Configuration File

The STM Logger process utilizes a configuration file to allow the user to tailor its operation. This file, called *diaglogd.cfg*, is automatically checked by the logger process before each log entry is processed. If the file has changed, logger will read it and reconfigure itself according to the settings in the file. If this file does not exist in the appropriate directory (*/var/stm/config/sys*), the logger process will simply use its default configuration values.

The logger configuration file may contain any or all of the following directives:

output-level <i>level</i>	Sets the logging level for the <i>diaglogd</i> daemon. Errors only level = 1 Errors and warnings level = 2 Errors, warnings and informationals level = 3
suspend	Suspends all logging. Logging will remain suspended until this directive is removed from the configuration file.
suspend-type <i>entry_type</i>	Suspends logging of entries of a particular type. Logging for this type will remain suspended until this directive is removed from the configuration file.
suspend-dev <i>device_path</i>	Suspends logging of I/O error entries for a particular device. Logging for this device will remain suspended until this directive is removed from the configuration file.
suspend-qual <i>product_qual</i>	Suspends logging of I/O error entries for a particular product qualifier. Logging for this product qualifier will remain suspended until this directive is removed from the configuration file.
suspend-logger <i>logger_id</i>	Suspends logging of I/O error entries for a particular <i>logger_id</i> . Logging for this <i>logger_id</i> will remain suspended until this directive is removed from the configuration file.
exec-type <i>entry_type prog_name</i> exec | no-exec [<i>fifo_name</i>]	If <i>exec</i> , executes a specified program when a particular <i>entry_type</i> is logged. If <i>fifo_name</i> is given, passes it the raw log entry via the specified FIFO file. If <i>no-exec</i> , just passes the raw log entry via the specified FIFO file. In either case,

the FIFO file will be created. Both *fifo_name* and *prog_name* must be fully qualified. The entry will still be logged as usual by the STM logger.

`exec-path device_path prog_name exec | no-exec [fifo_name]`

If `exec`, executes a specified program when an I/O error entry for a particular device is logged. If *fifo_name* is given, passes it the raw log entry entry via the specified FIFO file. If `no-exec`, just passes the raw log entry via the specified FIFO file. In either case, the FIFO file will be created. Both *fifo_name* and *prog_name* must be fully qualified. The entry will still be logged as usual by the STM logger.

`exec-qual product_qual prog_name exec | no-exec [fifo_name]`

If `exec`, executes a specified program when an I/O error entry for a particular product qualifier is logged. If *fifo_name* is given, passes it the raw log entry entry via the specified FIFO file. If `no-exec`, just passes the raw log entry via the specified FIFO file. In either case, the FIFO file will be created. Both *fifo_name* and *prog_name* must be fully qualified. The entry will still be logged as usual by the STM logger.

`exec-logger logger_id prog_name exec | no-exec [fifo_name]`

If `exec`, executes a specified program when an I/O error entry for a particular *logger_id* is logged. If *fifo_name* is given, passes it the raw log entry entry via the specified FIFO file. If `no-exec`, just passes the raw log entry via the specified FIFO file. In either case, the FIFO file will be created. Both *fifo_name* and *prog_name* must be fully qualified. The entry will still be logged as usual by the STM logger.

`log-for-exec`

Enables logging of errors which occur during attempts perform the above `exec-xxx` directives. Errors are logged to the system activity log. This directive is expected to be used only to track problems with newly added `exec-xxx` directives or `exec-xxx` directives which do not appear to be functioning properly.

disk-threshold <i>nn</i>	The % of disk space usage which, if exceeded, will result in logging being suspended until the usage drops back below this number. The default (i.e. if this directive does not appear in the configuration file) will be 95%.
rate-threshold <i>nn</i>	The rate of logging, in number of entries per minute, which if exceeded, will result in logging being suspended until the rate drops back below this number. The default will be 50 entries per minute.
switch-threshold <i>nn</i>	The size, in Kbytes, that the log file should be allowed to grow to before switching to a new log. The default will be unlimited.

Examples:

output-level 3	sets logging level to errors, warnings and informationals
suspend-type 2	suspends logging of LPMC entries.
suspend-dev 1/0/0	suspends logging of entries for the device at 1/0/0.
suspend-prod HPC2473S	suspends logging for product HPC2473S.
suspend-logger disc30	suspends logging for the disc30 driver.
exec-type 2 /usr/sbin/lpmc_prog exec /var/lpmc_fifo	invokes the program named lpmc_prog and passes it the raw log entry for LPMC entries thru the FIFO file /var/lpmc_fifo.
exec-dev 2/0/1.0.0 /usr/sbin/disk_prog exec /var/disk_fifo	invokes the program named disk_prog and passes it the raw log entry for entries for device 2/0/1.0.0 thru the FIFO file /var/disk_fifo.
exec-prod HPC35450A /usr/sbin/tape_prog exec /var/tape_fifo	invokes the program named tape_prog and passes it the raw log entry for entries for product HPC35450A thru the FIFO file /var/tape_fifo.
exec_logger tape2 /usr/sbin/tape_prog exec /var/tape_fifo	invokes the program named tape_prog and passes it the raw log entry for entries for the tape2 driver thru the FIFO file /var/tape_fifo.
exec-type 2 /usr/sbin/lpmc_prog no-exec /var/lpmc_fifo	passes the raw log entry for LPMC entries thru the FIFO file /var/lpmc_fifo.
exec-dev 2/0/1.0.0 /usr/sbin/disk_prog no-exec /var/disk_fifo	passes the raw log entry for entries for device 2/0/1.0.0 thru the FIFO file /var/disk_fifo.

`exec-prod HPC35450A /usr/sbin/tape_prog no-exec /var/tape_fifo`
passes the raw log entry for entries for product HPC35450A thru the FIFO file `/var/tape_fifo`.

`exec_logger tape2 /usr/sbin/tape_prog no-exec /var/tape_fifo`
passes the raw log entry for entries for the tape2 driver thru the FIFO file `/var/tape_fifo`.

`disk-threshold 80`
suspends logging if disk space usage exceeds 80%.

`rate-threshold 20`
suspends logging if the rate exceeds 20 entries/minute.

`switch-threshold 1000`
switches log files when the current one reaches 1 Mbyte.

Whenever a directive is added to the configuration file that results in logging being suspended, the logger process will log an entry itself which indicates when and for what entries logging has been suspended. Similarly, when a directive is removed from the file and logging is consequently resumed, an entry will be logged indicating when and for what entries logging has been resumed along with the number of entries that were lost during the suspension. Suspend/resume entries will also be logged by the logger when thresholds are reached causing logging to suspend and again when logging is resumed.