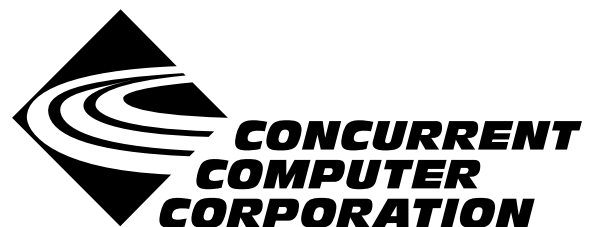


NightTrace

Version 5.3 Release Notes (PowerMAX)

December 2003

0890398-5.3



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1.0. Introduction

NightTrace™ is used for debugging and analyzing multiprocess and multiprocessor real-time applications and their interaction with the operating system.

The NightTrace toolset consists of an interactive debugging and performance analysis tool, trace data collection daemons, and an Application Programming Interface (API) allowing user applications to log data values:

NightTrace API	libraries and include files for use in user applications that log trace events to shared memory
ntrace	a graphical tool that controls daemon sessions and displays user and kernel trace events from trace event files
ntraceud	a daemon program that copies user applications' trace events from shared memory to trace event files
ntracekd	a daemon program that copies operating system trace events from kernel memory to trace event file

NightTrace is flexible. As a user, you control:

- selection of user tracing of your application and/or kernel tracing
- selection of timestamp source
- trace-point placement within your application
- the source language of the trace application
- the number of processes and CPUs you gather data on
- the amounts and types of information you display
- trace event searches and summaries

2.0. Documentation

Table 2-1 lists the NightTrace 5.3 documentation available from Concurrent.

Table 2-1. NightTrace Version 5.3 Documentation

Manual Name	Pub. Number
<i>NightTrace User's Guide</i>	0890398-110
<i>NightTrace Version 5.3 Release Notes (PowerMAX)</i>	0890398-5.3

Copies of the Concurrent documentation can be ordered by contacting the Concurrent Software Support Center. The toll-free number for calls within the continental United States is 1-800-245-6453. For calls outside the continental United States, the number is 1-954-283-1822 or 1-305-931-2408.

Additionally, the documentation listed above is available:

- online using the **nhelp** utility
- in PDF format in the **documentation** directory of the installation CD
- on the Concurrent Computer Corporation web site at www.ccur.com

3.0. Prerequisites

Prerequisites for NightTrace Version 5.3 are as follows:

3.1. Software

- PowerMAX OS 4.3 Patch 9 (P9) or later

or

PowerMAX OS 5.1 Service Release 3 (SR3) or later

NOTE

The aforementioned prerequisites are suggested in order to fully utilize the new kernel daemon capabilities provided by NightTrace. Otherwise, the following capabilities are unavailable and may cause unexpected behavior:

- **Pause/Resume** operations for kernel daemons will be unavailable
- **Flush** operation for kernel daemons will be unavailable
- statistics listed under the **Buffer** and **Lost** columns in the Daemon Details Area of the NightTrace Session Manager will be unavailable
- NightTrace Daemon Server package (**nstar**) (see “Target Installation” on page 5)
- X Window System (X11 Version 6.3 or later)*
- Élan License Manager™ 5.0.1 or later

3.2. Hardware

- Computer Systems:
 - Power Hawk™ 620 and 640
 - Power Hawk 710, 720 and 740
 - Power Hawk 900 Series
 - PowerStack™ II and III
 - Night Hawk® Series 6000
 - TurboHawk™
 - PowerMAXION™
- Board-Level Products:
 - Motorola MVME2604
 - Motorola MVME4604
- An X Window System display device, such as an X™ terminal*

* This is a prerequisite only for the NightTrace Event Analysis package (**ntrace**). It is not required by the NightTrace Event Logging package (**ntracelog**).

4.0. System Installation

The NightTrace product is installed as two standard PowerMAX OS software packages and utilizes the standard PowerMAX OS product installation mechanism, **pkgadd** (see **pkgadd (1)**).

The package names are **ntrace** and **ntracelog**. These names are case-sensitive.

ntrace the NightTrace Event Analysis package. It consists of everything necessary to display trace event data.

ntracelog the NightTrace Event Logging package. It consists of everything necessary to collect trace event data.

The **ntrace** and **ntracelog** packages can be installed together or separately because there are no package dependencies between them. The **ntracelog** package was designed for installation on minimally configured systems that do not have the X11 packages installed and which will be used for event logging but not event analysis.

NOTE

In order to perform kernel tracing, the **trace** package, as shipped with PowerMAX OS, must be installed on the system. Once installed, the **trace** module needs to be activated via the **config (1)** command.

In addition, for proper execution of the NightTrace Session Manager, the PowerMAX OS package **nstar** (shipped with the NightTrace product) must be installed on the NightTrace host and any NightTrace target system (see “Target Installation” on page 5).

Please refer to the “Installing Add-on Software” chapter in the *System Administration Volume I* (0890429) manual and the *PowerMAX OS Release Notes* for instructions on software installation.

NightTrace may be installed in either the root directory or elsewhere. When you run **pkgadd (1M)** to install NightTrace, you are prompted to enter the name of the directory for installation. If you want to install in the root directory, just press the <return> key at the prompt. Otherwise, enter the name of the directory where you want NightTrace installed. If this directory does not exist, the installation procedures attempt to create it for you.

NightTrace *requires* the Élan License Manager. Follow the steps in the "Obtaining Licenses" section of the *Élan License Manager Release Notes* (0891055); the *feature alias* is NightTrace. If you are not already running the Élan License Manager, if you do not have a copy of the *Élan License Manager Release Notes*, or if you need a license key, contact Concurrent Software Distribution at 1-800-666-5405 (or 1-954-283-1836 outside the continental United States).

4.1. Target Installation

For proper operation of the session management features in NightTrace 5.3, the following software package must be installed on the NightTrace host and on any target system:

NightStar Tool	Package	Version
NightStar Daemon Server	nstar	1.2-007

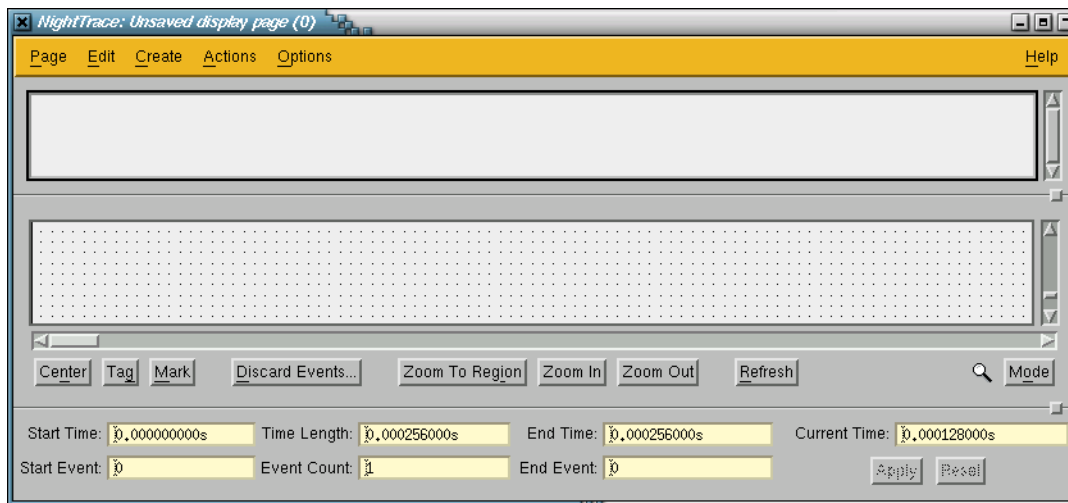
This package is shipped with the NightTrace product.

5.0. Overview of NightTrace 5.3

5.1. Changes in This Release

5.1.1. Enhanced Display Pages

NightTrace's display pages have been improved to provide more flexibility and to save screen space.



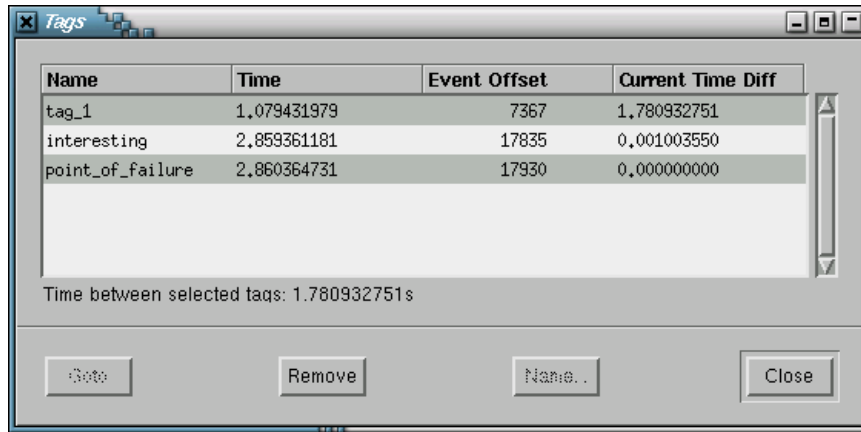
- The display grid area now has a vertical scroll bar for large displays
- The **Zoom Factor** and **Increment** settings have been moved to the **Options** menu to save a row on the display page.
- The text fields describing start time, start event, and intervals can be hidden with the vertical window pane to save space.
- A **Tag** button has been added.
- The **Options** menu has been added which includes the **Zoom Factor** and **Increment** settings as well as an option to automatically disambiguate process names for kernel display pages.
- The **Edit** and **View** radio boxes have been moved to a **Mode** button in the lower right-hand portion of the window.
- **Grid Labels**, **Data Boxes**, **Event Graphs**, **State Graphs**, and **Data Graph** display grid objects may now be copied and pasted into the display grid or column.
- When in edit mode, double-clicking the left mouse button on display objects launches the configuration dialog for that object. Note that the key sequence ctrl-C no longer activates the configuration dialog.
- When in view mode, double-clicking the left mouse button on a state graph automatically summarizes the state defined by the graph and displays the results in the scrollable text area at the top of the display page.

5.1.2. Enhanced Display Object Configuration Dialogs

The configuration dialogs used for Data Boxes, Event Graphs, State Graphs, and Data Graphs has been enhanced to provide drop-down menu lists and full customization using dialogs similar to those used for the definition of Qualified Expressions and Qualified States.

5.1.3. User-Defined Tags

Tags are associated with a specific timestamp in a data-set. The user can set a tag at the current time line by pressing the **Tag** button. Alternatively, you can associate a tag with the time of a specific event by clicking the right mouse button on an event in the display. Tags are indicated on the display Ruler as objects with a number. Tags can be given user-defined names for subsequent searching and analysis.



The Tags dialog indicates all current tags, their position, the difference in time between the tags themselves and the current timeline, as well as difference in time between two selected tags. Double-clicking the left mouse button on an tag entry in the list causes the current timeline to be moved to the associated tag.

Tags are persistent between NightTrace invocations as they are associated with NightTrace sessions.

5.1.4. Enhanced String Table Editing

String tables can now be easily manipulated through the NightTrace graphical user interface by double-clicking the left mouse button on the String Tables item in the Session Overview area of the main window. A variety of dialogs are presented to manage existing string tables or add new ones. String table changes made through these dialogs become part of the current NightTrace session.

5.1.5. Improvements to Data Trimming Operations

The Trim button has been replaced with the Discard Events... button which launches a dialog. The dialog allows the user to specify whether the selected region of events should be removed from the data set or whether all other events should be removed, thereby preserving only the events from the selected region.

Once data has been trimmed, a marker appears on the ruler indicated that the events were discarded. When choosing Discard Selected Events, the mark appears at the location of the first event that was removed. When choosing Discarded Unselected Events, the mark appears at the location of the last event that was not discarded. In either case, an internal event, NT_DISCARDED_DATA is logged at that location and its first argument indicates the number of events that were removed.

5.1.6. Crash Dump Support for PowerMAX OS Targets

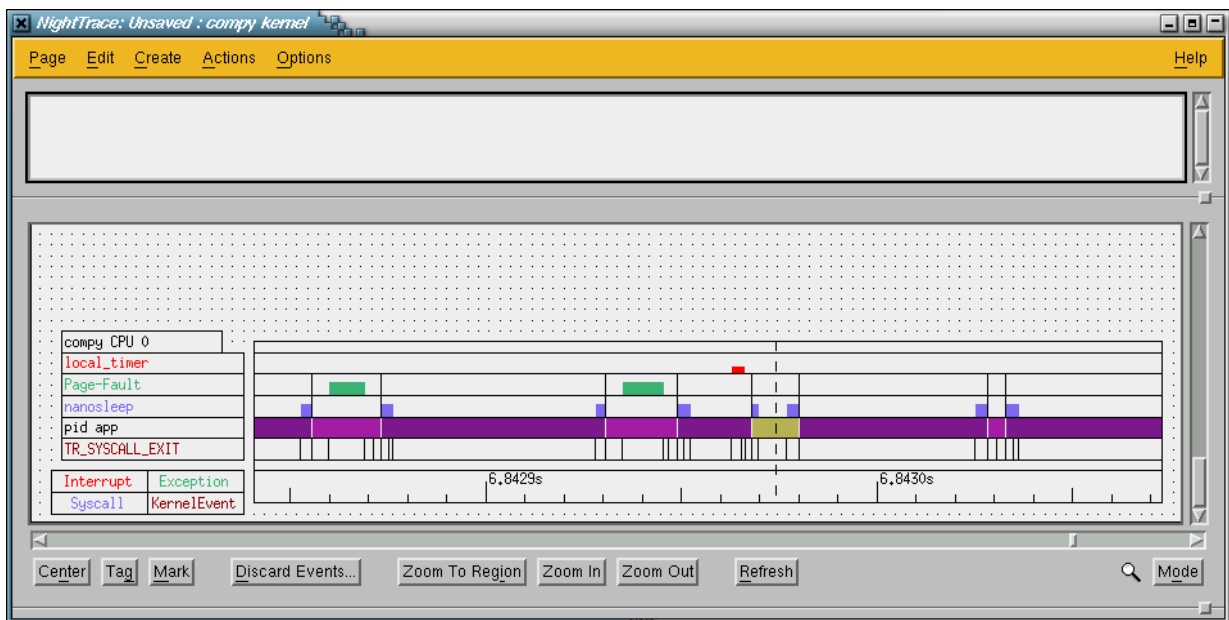
Support was added for extracting kernel trace data from PowerMAX OS kernel crash files. This is useful when kernel tracing is active but the system crashes or halts before the relevant data can be retrieved and written to disk or streamed to NightTrace. Invoke **ntrace** with the **vmcore** and **unix** images associated with the crash dump:

```
ntrace /var/crashfiles/vmcore.10 /var/crashfiles/unix.10
```

Currently, this support is only available when running **ntrace** on a PowerMAX OS system.

5.1.7. Enhanced Kernel Display Pages

An additional data graph was added to the default kernel display page.



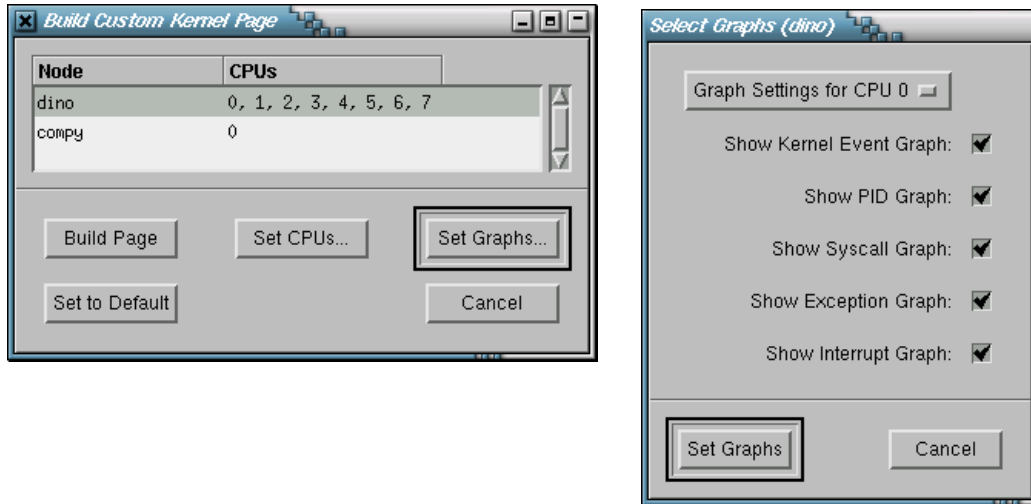
A fourth row was added for each CPU which tracks the activity of processes on that CPU. A colored bar indicates that a process other than /idle is assigned to the CPU. Each process is automatically assigned a distinctive color and retains that color throughout the dataset.

The example above clearly indicates that a process represented by the deep purple color was context switched out four times in the displayed interval. The process name is displayed on the left hand side data box.

Processes with common process names can now be easily differentiated by selecting the **Distinguish Processes** item from the **Options** menu. When this option is selected, all process names have their process ID (PID) appended to their name.

5.1.8. Kernel Page Builder Wizard

The addition of the fourth row for the PID graph in kernel display pages increases the amount of display grid space required for a system. For systems with several processors, this may be undesirable. The Custom Kernel Page item from the Page menu on the main window launches a dialog which allows for customization of kernel display pages providing for selection of specific CPUs from specific systems and selection of the graphs to be displayed for each CPU.



5.1.9. Changes to Multiple Selection

Selection of multiple items from all dialogs and within NightTrace requires a combination of left mouse clicks with either the Shift or Ctrl key depressed.

5.1.10. Improved Data-Set and Session Management

In order to simplify the management of data sets and session files, new menu choices have been added. Selecting the **Save Session Copy** item from the **NightTrace** menu in the main window automatically creates a new session file and copies all data sets, configuration pages, string tables, and all session-related data to the new session. A new session name is automatically generated and is displayed in **Session Configuration file** title of the main window. The new session becomes active and the old session is closed and left unchanged.

This is especially useful when trimming or deleting events from data sets so that you can easily preserve the original data yet create a separate session with just the data of interest.

The semantics of the **Save Session** item have changed slightly. If no session was previously defined, a new session name is automatically generated and is displayed in **Session Configuration file** title of the main window. Select **Save Session As** if you wish to chose the name of a new session.

In order to exit NightTrace immediately and avoid any warning diagnostics about unsaved data, configuration, or session changes, select the **Exit Immediately** item from the **NightTrace** menu in the main window. All active daemons are terminated and all unsaved changes are discarded.

5.1.11. Improved Kernel Event Enabling

In the previous release, customized selection of individual kernel trace events did not properly function.

These problems have been corrected in both the **ntracekd** command line tool and the **Events** tab of the **Daemons** dialog in the main window.

ntracekd now allows for specification of a + or - sign with out any trailing event name or number, which enables or disables all events. This can be useful when wanting to enable just a few events. For example, the following command captures system call trace information but disables all other selectable trace events:

```
ntracekd --events=-,+switchin,+syscall_entry,+syscall_exit ...
```

5.1.12. Accelerator Key Review

Accelerator keys were added in the previous release for ease and convenience on the NightTrace Main Window as well as the Display Pages. Some minor changes were made in this release. The following tables summarize accelerator key usage. Changes in this release are marked with an asterisk.

Main Window	
ctrl-d	new daemon dialog
ctrl-e	edit daemon
ctrl-f	flush daemon buffer
ctrl-l	launch daemon (previously start)
ctrl-h	halt daemon (previously stop)
ctrl-p	pause daemon
ctrl-q*	exit
ctrl-r	resume daemon
ctrl-s	save session
ctrl-y*	copy session
ctrl-w	close the NightTrace Main Window
alt-q*	exit immediately

Display Pages	
up-arrow	zoom out
down-arrow	zoom in
left-arrow	scroll left
right-arrow	scroll right
>	search forward with last criteria
<	search backward with last criteria
ctrl-a	select all
ctrl-c*	copy select grid object

Display Pages	
ctrl-d*	launch Discard Events dialog
ctrl-e	launch qualified expressions dialog
ctrl-g*	set Tag at current timeline
ctrl-i*	zoom to region
ctrl-m*	set the Mark to the current timeline
ctrl-n	center current timeline in interval
ctrl-o*	toggle edit/view mode
ctrl-r	refresh interval display
ctrl-t*	launch tags dialog
ctrl-v*	paste new grid object
ctrl-x	delete selected grid object
ctrl-z	open summary dialog
ctrl-w	close current display page

NOTE

It is not necessary to press the Shift key to use the > or < accelerator.

5.2. Common Problems and Limitations

5.2.1. Privileges and Capabilities

A common problem when using the NightTrace API is that the `trace_begin()` (or `trace_start()`) call may fail if the lacks sufficient privileges to lock pages or utilize appropriate spin lock protection in which case no events are logged.

The application should be sure to check the return codes from `trace_begin()` (or `trace_start()`) and `trace_open_thread()` to ensure that subsequent `trace_event()` calls will actually log data.

6.0. Cautions

6.1. TCP High-Water Mark Settings

If you experience kernel event loss while streaming, it may be due to insufficient TCP high-water mark settings on your PowerMAX OS system. By default, the TCP high-water marks are ~36K, which is an extremely low value, and can cause delays during I/O read and write operations of significant sizes.

We recommend adding the following commands to the **/etc/rc2.d/S69inet** script to raise the high-water mark settings.

```
$NDD -set /dev/tcp tcp_recv_hiwater_def 4194304
$NDD -set /dev/tcp tcp_xmit_hiwater_def 4194304
```

Add the above lines to the script *after* the existing lines of the form:

```
$NDD -set /dev/tcp tcp_old_urp_interpretation 1
$NDD -set /dev/ip ip_respond_to_timestamp 1
$NDD -set /dev/ip ip_respond_to_timestamp_broadcast 1
```

7.0. Direct Software Support

Software support is available from a central source. If you need assistance or information about your system, please contact the Concurrent Software Support Center at 1-800-245-6453. Our customers outside the continental United States can contact us directly at 1-954-283-1822 or 1-305-931-2408. The Software Support Center operates Monday through Friday from 8 a.m. to 7 p.m., Eastern Standard time.

Calling the Software Support Center gives you immediate access to a broad range of skilled personnel and guarantees you a prompt response from the person most qualified to assist you. If you have a question requiring on-site assistance or consultation, the Software Support Center staff will arrange for a field analyst to return your call and schedule a visit.

