

TRACE32 eCos Awareness

RTOS Debugger for eCos

ARM
COLDFIRE
MIPS
NIOS-II
PowerPC
VR
XSCALE

- Real time, non-intrusive display of eCos system resources
- eCos specific display of trace listing
- Statistic evaluation and graphic display of thread run times
- Thread related evaluation of function run times
- Statistic evaluation and graphic display of thread states
- Thread stack coverage
- Thread context display
- PRACTICE functions for OS data
- eCos related pull-down menu

The TRACE32 System includes a configurable multithread debugger to provide symbolic debugging in real time operating systems. Our software package contains a ready-to-run configuration for the eCos Real Time Kernel.

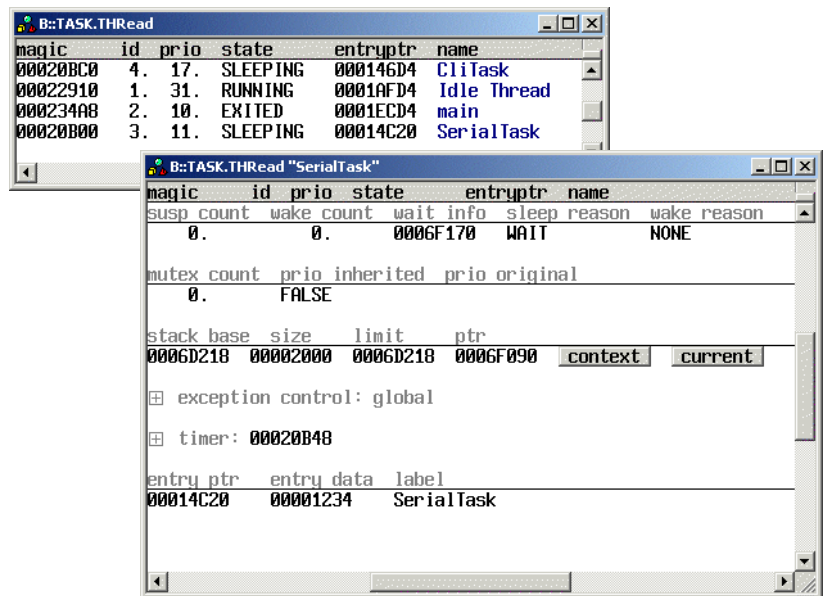
We built a special multithread support for eCos. This leaflet will guide you through the additional implemented features in TRACE32, to do an effective debugging on eCos systems.

Multitask Debugging on TRACE32 with eCos

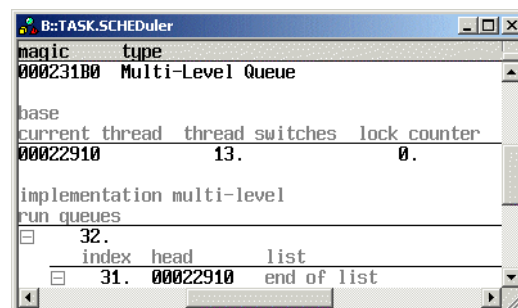
Real Time, Non-Intrusive Display of eCos System Resources

The TRACE32 multitask debugger for eCos provides special display functions. Scheduler information and threads can be displayed. In addition, by using the emulators dual-port mem-

ory, the display of all these regions can be viewed non-intrusively in real time. The tables are updated permanently ("On The Fly"), without affecting the application at all.



Thread list window and detailed window of one specific thread



Scheduler information window

eCos Specific Display of Analyzer Listing

The data recorded in the analyzer can be displayed and interpreted specific to the operating system. The thread switches can be displayed symbolically.

```

BTrace.List.TASK lhl address cycle d.l symbol ti.back
record address cycle d.l symbol
163 | stwu r31,0xE7C(r29) // restore current thread p
--- THREAD magic = 00020BC0, id = 4., name = CllTask ---
0020219 D:00020E7C wr-long 00020BC0 ..heduler_Base::current_thread 0.100us
0020218 P:0001BEA0 fetch 939E0E80 ..Scheduler::unlock_inner+0x94 0.100us
173 | need_reschedule = false; // finished rescheduling
0020217 D:00020E80 wr-long 00000000 ..eduler_Base::need_reschedule 0.100us
0020216 P:0001BEA4 fetch 3D200002 ..Scheduler::unlock_inner+0x98 0.100us
178 | sched_lock = 0; // Clear the lock
0020215 P:0001BE80 fetch 93890E78 ..Scheduler::unlock_inner+0x9C 0.100us
| stwu r20,0xE70(r9)
0020214 D:00020E78 wr-long 00000000 ..bal\cyy_scheduler_sched_lock 0.100us
0020213 P:0001BEAC fetch 001A0E74 ..Scheduler::unlock_inner+0xA0 0.100us
179 | HAL_REORDER_BARRIER();
| luz r0,0xE74(r26)
0020212 D:00020E74 rd-long 00000000 ..obal\cyy_interrupt::dsr_list 0.100us
0020211 P:0001BE80 fetch 2C000000 ..Scheduler::unlock_inner+0xA4 0.100us

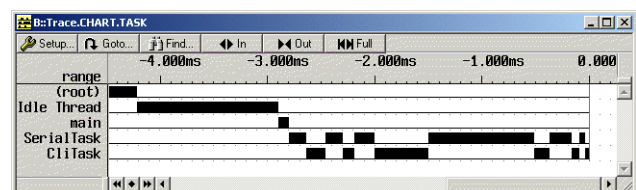
```

Analyzer listing, display of raw data, assembler mnemonics, source line and thread switches

Statistic Evaluation and Graphic Display of Thread Run Times

The analyzer can calculate statistic tables of thrad run times and thread switches. A graphical diagram shows which thread was active at a specific time, giving a clear view of the behaviour of the system.

range	time	avr	count	ratio	1%	2%	5%	10%
Idle Thread	1.318ms	658.850us	2.	10.053%	[Bar chart]			
main	99.200us	99.200us	1.	0.756%	[Bar chart]			
SerialTask	1.772ms	295.350us	6.	13.520%	[Bar chart]			
CllTask	1.035ms	172.467us	6.	7.895%	[Bar chart]			
		total: 13.107ms						



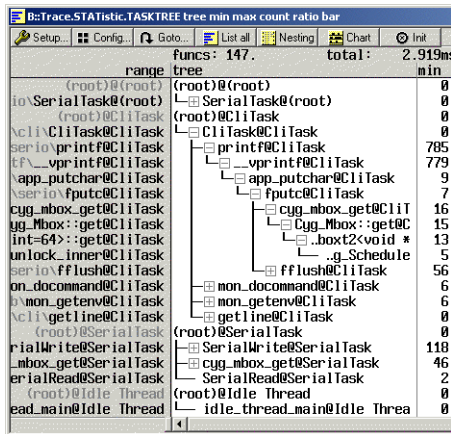
Statistics and flow of threads

Thread Related Evaluation of Function Run Times

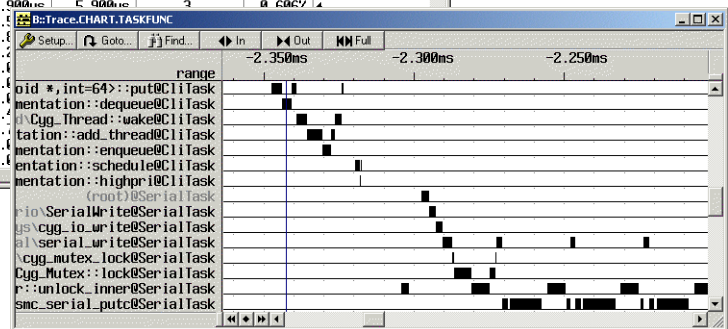
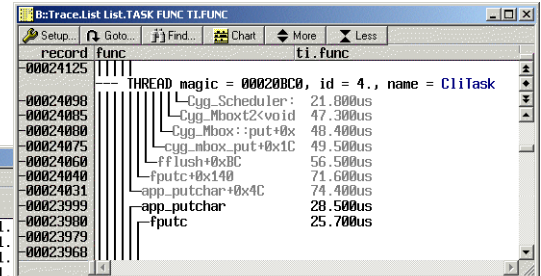
The statistic and graphic evaluation of function calls and function run times can be done dependant to the actual

running thread. This is necessary, if different threads call one single function at the same time, or if a thread switch occurs in between the function.

Analyzer listing, function call hierarchy and thread switches



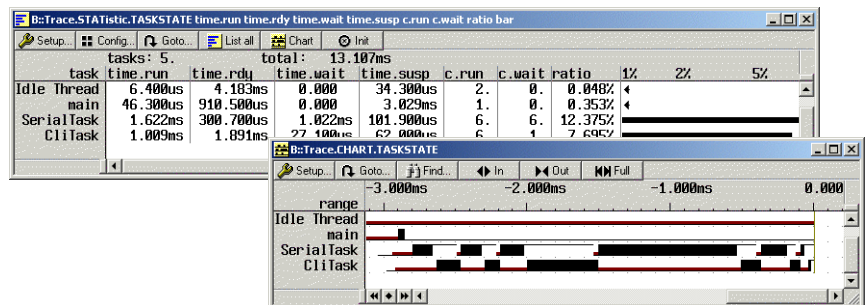
Statistics and chart on function hierarchy, thread related



Statistic Evaluation and Graphic Display of Thread States

These tabular and graphical analyses of the status of thread show the various states (i.e. running, ready, waiting, suspended and undefined) and times each

thread spent in each state. A graphical view of the data can help to highlight prioritisation problems, critical paths etc.



Statistics and flow of thread states

Thread Stack Coverage

In real time systems it is quite important to know, how much stack space each thread consumes. For this pur-

pose a special window shows the current and the maximum usage of each separate thread.

name	low	high	sp	% low	spare	max	0	10
CliTask	00027618	00029618	00029440	5%	00029291	00001C79	11%	
Idle Thread	00022980	00023180	00023168	3%	0002380C	0000072C	10%	
main	00023548	00025548	000253E0	4%	000253E1	00001E99	4%	
SerialTask	0006D218	0006F218	0006F090	4%	0006F091	00001E79	4%	

Thread stack coverage window

Thread Context Display

The TRACE32 Multitask debugger provides an easy way to switch the current displayed context to another thread. Normally all register related windows (e.g. listing at current PC, local variables or function call stack) are dis-

played related to the actual context (i.e. current executed thread). You can switch to the context of another thread to see all this information at the time this thread was scheduled.

PRACTICE functions for OS data.

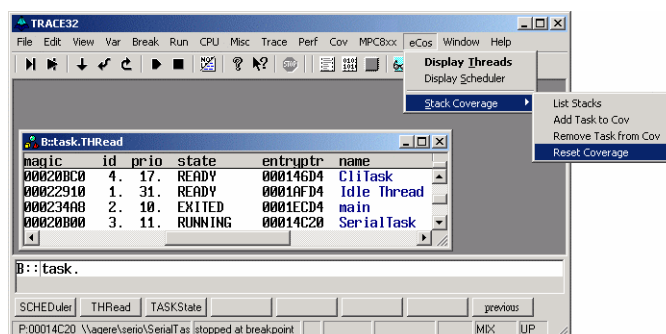
The support includes extended PRACTICE functions for eCos specific data. E.g. the function "TASK.CONFIG

(magic)" returns the id of the so called magic value, which corresponds to the id of the current executed thread.

eCos related pull-down menu

Because the menu bar of the TRACE32 user interface can be fully customized, you can create a new pull down menu, including operating sys-

tem specific commands. We deliver eCos support with an example for such specific menus, which provides fast access to the eCos features.



TRACE32 with eCos menu

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