TRACE32®
Technical Information

RTOS-LINUX

12.11.20

RTOS Debugger for Linux

ANDES
ARC
Arm/Cortex
BEYOND
COLDFIRE
Intel Processors
MICROBLAZE
NIOS-II
MIPS
POWERPC
RISC-V
SH4
VR
XSCALE

- ■ Debugging Linux Kernel, Modules and Device Drivers
- ■ Debugging Several Linux Processes and Libraries At Once
- ■ Run- and Stop Mode Debugging for Applications and Libraries
- ■ Support for SMP Linux
- ■ Full integrated MMU support
- ■ Display of all Linux System Resources
- ■ Task Related Breakpoints
- ■ Task Context Display
- ■ Dynamic Task Performance Measurement
- ■ Linux Specific Evaluation of Real Time Trace
- ■ Linux related pull-down menu

The TRACE32 system includes a configurable RTOS debugger to provide symbolic debugging in multitasking operating systems. Our software package contains a ready-to-run configuration for the Linux operating system.

The Linux awareness provides easy access to task lists and other kernel information, generates performance analysis data and enables you to do a most effective debugging with the TRACE32 systems on targets running Linux.
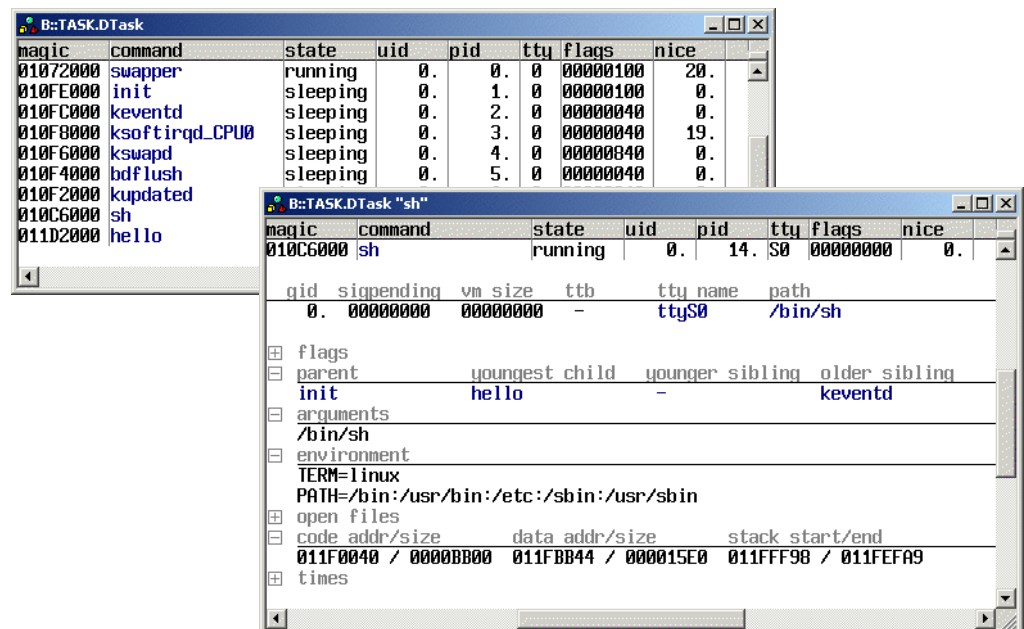
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This awareness supports all Linux distributions, bundles and platforms using the standard Linux kernel, like Android und Moblin.

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OS Awareness on TRACE32 with LINUX

Real Time, Non-Intrusive Display of Linux System Resources

The TRACE32 RTOS debugger for Linux provides display functions to show the system resources of Linux. The tasks can be displayed and inspected, and the processes are shown similar to the shell's "ps" command. This functionality is still available, even if the system's "ps" application is not available in your Linux image. In addition, by using the processors capability of reading the target memory while the application is running, or by using the emulators dual-port memory (if available), 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.

Task list window and detailed window of one specific task

"ps"-like process list window

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Kernel and/or Application Debugging

Due to the fact, that TRACE32 is a hardware debugging tool, you are able to debug anything you want, including bootstrap code, initialization phase, interrupt routines, drivers, kernel, etc. TRACE32 includes a complete MMU support, providing mechanisms to inspect the target memory using virtual addresses or physical addresses and to show the translation tables.

Additionally, TRACE32 has a special MMU support for several address spaces, which allows you to debug several Linux applications (processes) at once. An internal logic provides you with an easy access to all process memory spaces. A special process detection mechanism allows to halt the application exactly on the entry point of a process, allowing you to debug your process right from main().

Process watch list

Integrated Run- and Stop-Mode Debugging

Applications and libraries can be debugged in "run-mode", i.e. everything else is continuing to run, while the application is stopped. You may use the standard gdbserver for run-mode

debugging, or our own server to debug several processes in run-mode in parallel. TRACE32 also supports run- and stop-mode debugging integrated into one user inteface.

Task Related Breakpoints

Any breakpoint set in the TRACE32 debugger can be set dependent to a specific task. This means, that the

breakpoint will then only halt, if hit by the specified task. This allows task related debugging even in shared code.

Task Context Display

The TRACE32 RTOS Debugger provides an easy way to switch the current displayed context to another task. Usually all register related windows (e.g. listing at current PC, local variables or

function call stack) are displayed to the actual context (i.e. current executed task). You can switch to the context of another task, to see all this information at the time this task was scheduled.

Dynamic Thread Performance Measurement

While Linux is running, TRACE32 is capable of recurrently evaluating the current running task and collecting the results. The percentage, each task consumes of the system, is then displayed graphically and updated permanently. The longer time you let the measurement run, the more exact are the results. This feature is available even without any hardware trace.
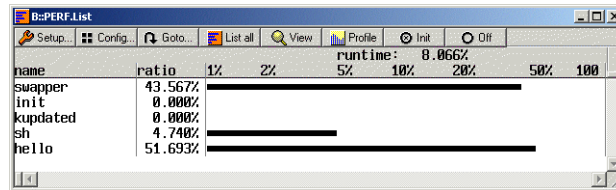
Performance measurement list

Linux Specific Display of Analyzer Listing

The data recorded in the real time trace buffer (if available) can be displayed and interpreted specific to the operating system. The task switches area displayed symbolically, either exclusively or in addition to other information.


Trace listing, task switch (access at aligned_data), memory accesses, assembler and HLL information

Statistic Evaluation and Graphic Display of Task Run Times

Out of the real time trace buffer (if available), the analyzer can calculate statistic tables of task run times and task switches. A graphical diagram shows

which task was active at a specific time, giving a clear view of the behaviour of the system.
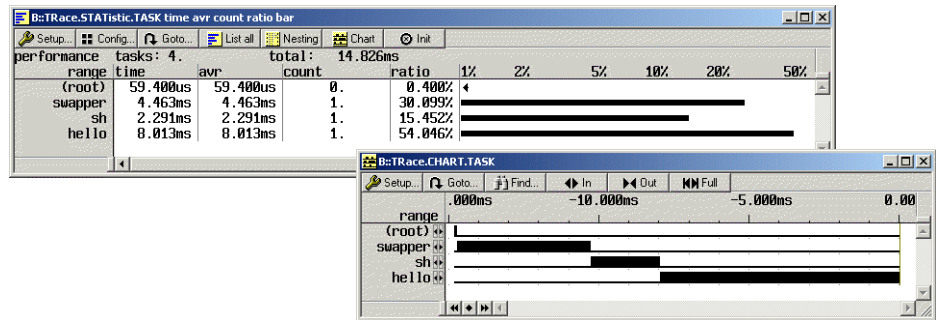
Statistics and flow of tasks

Task Related Evaluation of Function Run Times

The statistic and graphic evaluation of function calls and function run times (if available) can be done dependant to the actual running task. This is neces-

sary, if different tasks call one single function at the same time, or if a task switch occurs in between the function.
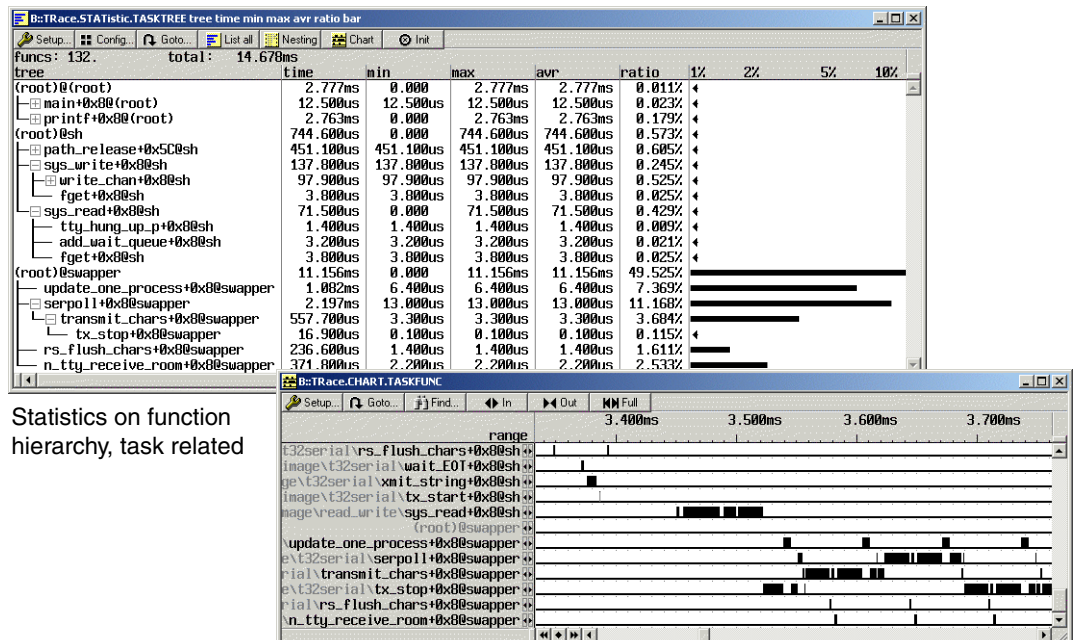

Statistics on function hierarchy, task related

Flow of functions, related to the calling tasks

Statistic Evaluation and Graphic Display of Task States

If covered by the real time trace, these tabular and graphical analyses of the status of tasks show the various states (i.e. running, ready, waiting, suspended and undefined) and times each task spent in each state. A graphical view of the data can help to highlight prioritisation problems, critical paths etc.
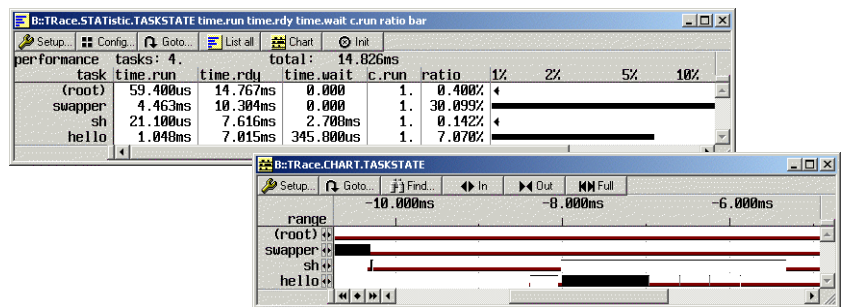
Statistics and flow of task states

PRACTICE Functions for OS Data.

The support includes extended PRACTICE functions for process specific data. E.g. the function "task.proc.spaceid("hello")" returns an id specifying the MMU memory area that this process uses.

Linux 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 system specific commands. We deliver Linux support with an example for such specific menues, which provides fast access to the Linux features.
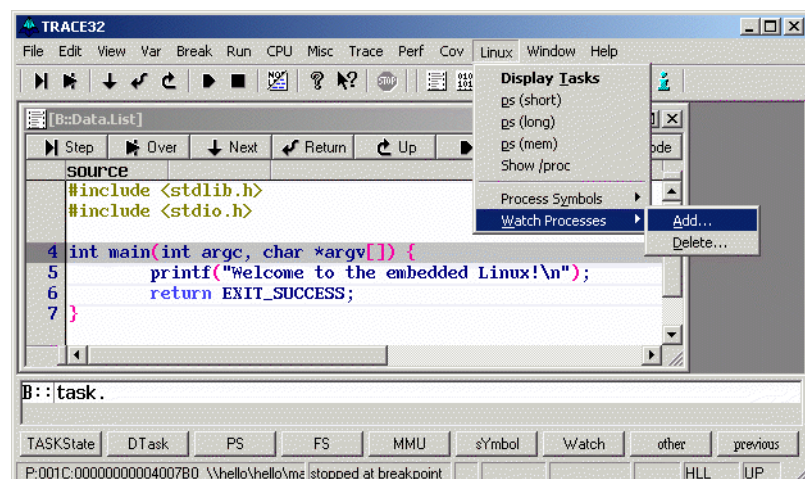
TRACE32 with source window and opened Linux menu

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