



RTOS Debugger for OSEK/ORTI

all

- ORTI 2.0 to 2.2 compliant
- Real Time, Non-Intrusive Display of OSEK System Resources
- Task Related Breakpoints
- Task Stack Coverage
- Task Context Display
- Dynamic Task Performance Measurement
- OSEK Specific Display of Trace Listing
- Statistic Evaluation & Graphic Display of Task Run Times
- Statistic Evaluation & Graphic Display of Task States
- Statistic Evaluation & Graphic Display of Service Run Times
- Statistic Evaluation & Graphic Display of Task Related Function Run Times
- OSEK related Pull-down Menu

The OSEK Run Time Interface (ORTI) specifies a way to inform the debugger about all the internals of the OSEK OS, that are necessary to do an effective OS aware debugging. Based on ORTI, the TRACE32 System includes a sophisticated OSEK OS awareness to provide symbolic debugging in OSEK/VDX systems.

RTOS Awareness on TRACE32 for OSEK/VDX Systems

ORTI 2.0 and 2.1 Compliant

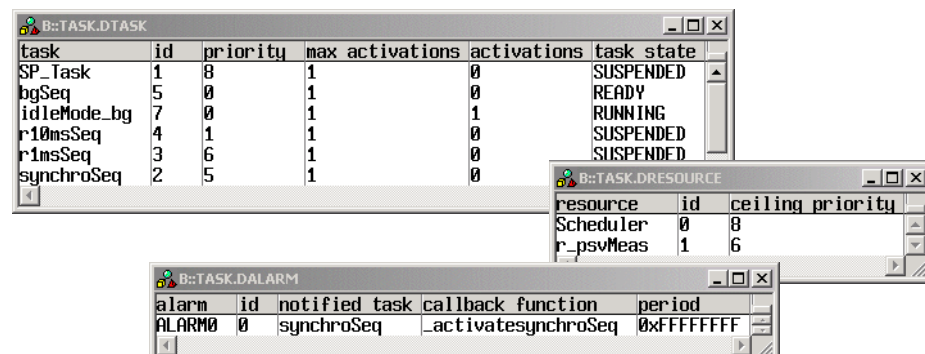
The TRACE32 Debugger is compliant to all ORTI versions in use. I.e. the industry-standard 2.0 (introduced in 1998) and the official release 2.1 (released in 2002). Lauterbach is a member of the ORTI working group and thus is always in time with new OSEK-ORTI releases.

The following features depend on the information exported by the ORTI generator of the OS vendor. Not all features may be available if the appropriate information isn't exported.

Real Time, Non-Intrusive Display of OSEK System Resources

The TRACE32 RTOS Awareness for OSEK provides special display functions. All system resources exported by ORTI (e.g. task list, counters, alarms, stacks and resources) can be displayed. In addition, by using the emula-

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

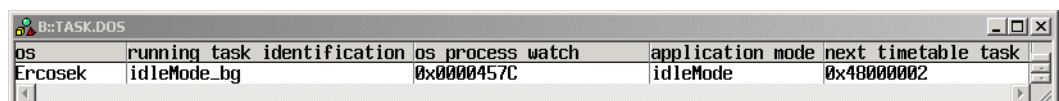


| task | id | priority | max activations | activations | task state |
|-------------|----|----------|-----------------|-------------|------------|
| SP_Task | 1 | 8 | 1 | 0 | SUSPENDED |
| bgSeq | 5 | 0 | 1 | 0 | READY |
| idleMode_bg | 7 | 0 | 1 | 1 | RUNNING |
| r10msSeq | 4 | 1 | 1 | 0 | SUSPENDED |
| r1msSeq | 3 | 6 | 1 | 0 | SUSPENDED |
| synchroSeq | 2 | 5 | 1 | 0 | SUSPENDED |

| resource | id | ceiling | priority |
|-----------|----|---------|----------|
| Scheduler | 0 | 8 | |
| r_psvMeas | 1 | 6 | |

| alarm | id | notified task | callback function | period |
|--------|----|---------------|---------------------|------------|
| ALARM0 | 0 | synchroSeq | _activatesynchroSeq | 0xFFFFFFFF |

Samples of a task list window, a resource window, and an alarm window



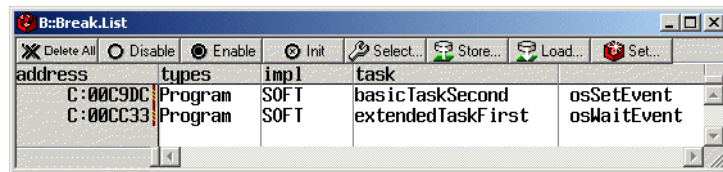
| os | running task | identification | os process watch | application mode | next timetable | task |
|---------|--------------|----------------|------------------|------------------|----------------|------|
| Ercosek | idleMode_bg | | 0x0000457C | idleMode | 0x48000002 | |

Configuration of OSEK operating system window

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.

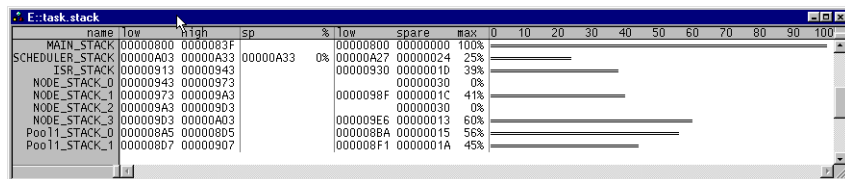


Breakpoint list with task dependent breakpoints

Task Stack Coverage

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

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



Task stack coverage window

Task Context Display

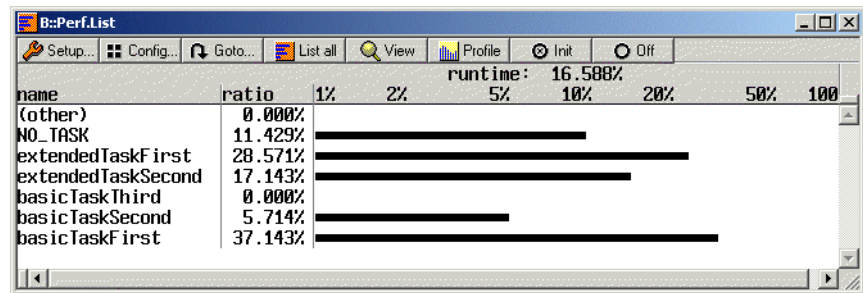
The TRACE32 Multitask debugger provides an easy way to switch the current displayed context to another task. Normally all register related windows (e.g. listing at current PC, local variables or function call stack) are dis-

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

Dynamic Task Performance Measurement

While the OSEK OS 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.

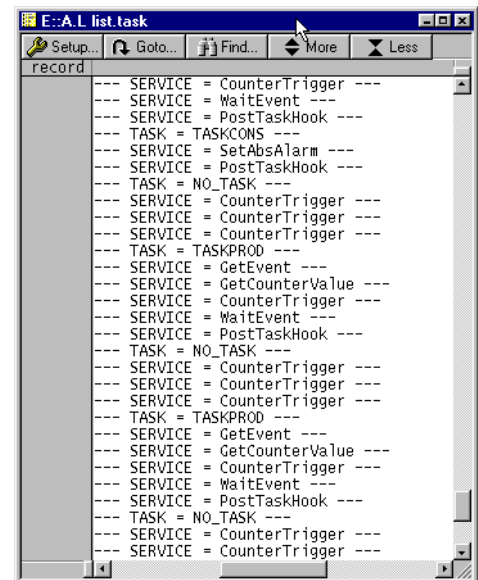


Performance measurement list

OSEK Specific Display of Trace Listing

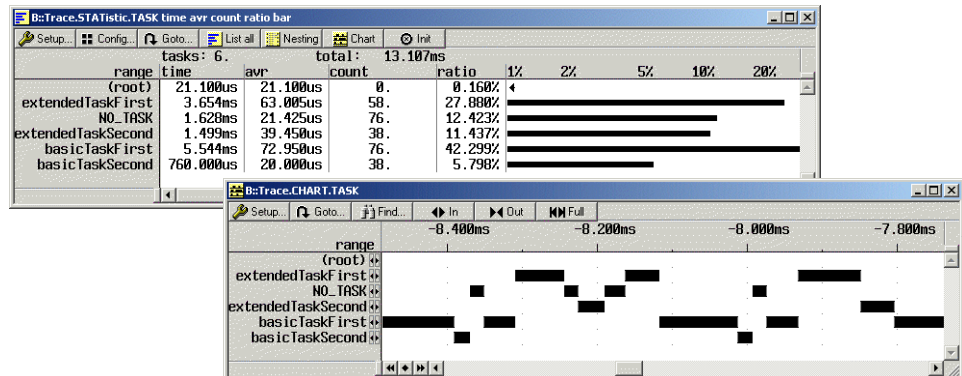
The data recorded in the trace buffers can be displayed and interpreted specific to the operating system. Task switches and service calls are displayed symbolically.

Trace listing, display of task switches and service calls



Statistic Evaluation and Graphic Display of Task Run Times

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.

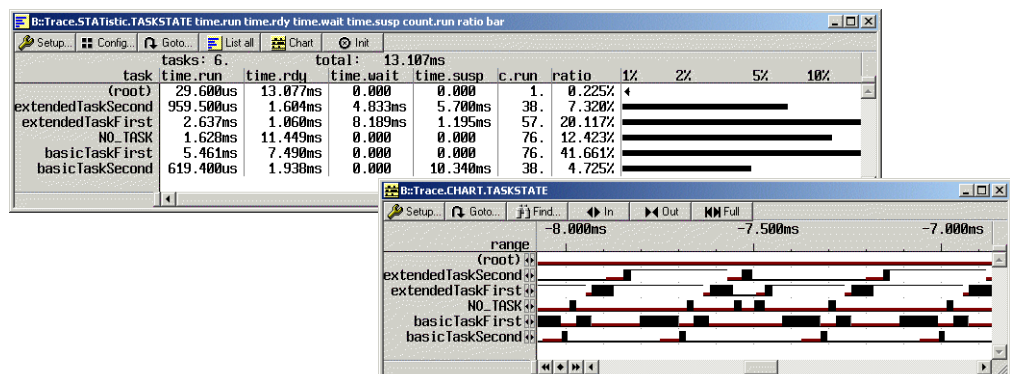


Statistics and flow of tasks

Statistic Evaluation and Graphic Display of Task States

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 this data can help to highlight prioritization problems, critical paths, etc.

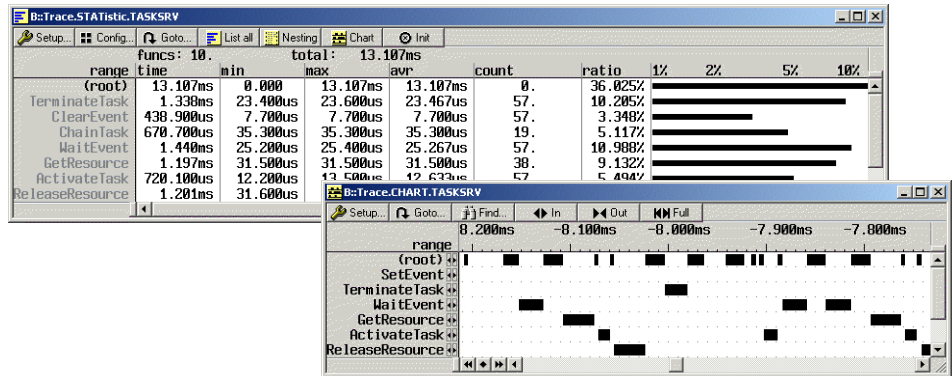


Statistics and flow of task states

Statistic Evaluation and Graphic Display of Service Run Times

The timing statistic and graphical flow of service calls and service run times can be evaluated. This is necessary to detect, if one service takes too much

time and is called very often, so that the performance of the whole operating system goes down..

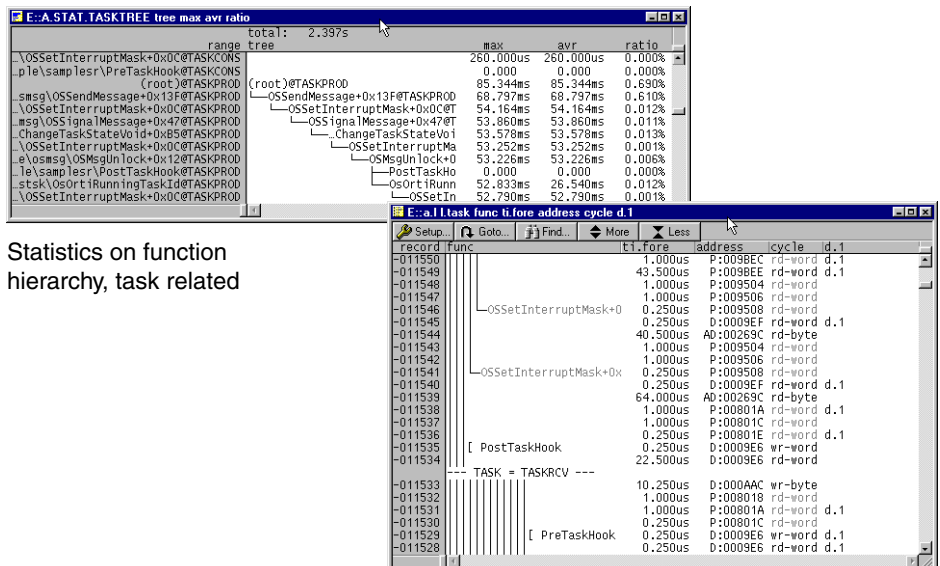


Statistics and flow of services

Task 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 task. This is necessary, if dif-

ferent 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

Trace listing, function call hierarchy and task switches

PRACTICE Functions for OS Data

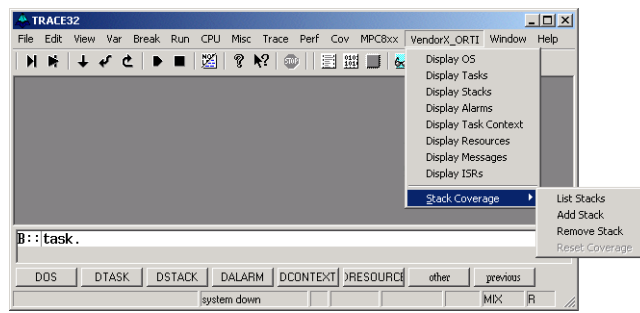
The support includes extended PRACTICE functions for process specific data. E.g. the function "TASK.CONFIG(magic)" returns the address of the

so called magic value, which corresponds to the address of the current running task.

OSEK 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 OSEK support with an example for such specific menus, which provides fast access to the OSEK features.



TRACE32 with OSEK menu

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