

RTOS Debugger for MicroC/OS-II

- Display of all $\tilde{\mu}$ C/OS System Resources
- Task Related Breakpoints
- Task Stack Coverage
- Task Context Display
- Dynamic Task Performance Measurement
- $\tilde{\mu}$ C/OS-II Specific Display of Trace Listing
- Statistic Evaluation and Graphic Display of Task Run Times
- Statistic Evaluation and Graphic Display of Function Run Times
- Statistic Evaluation and Graphic Display of Task States
- PRACTICE Functions for OS Data
- $\tilde{\mu}$ C/OS-II Related Pull-Down Menu

The TRACE32 System includes a configurable RTOS debugger to provide symbolic debugging in real time operating systems. Our software package contains a ready-to-run configuration for the $\tilde{\mu}$ C/OS-II Real Time Kernel from Micrium Inc.

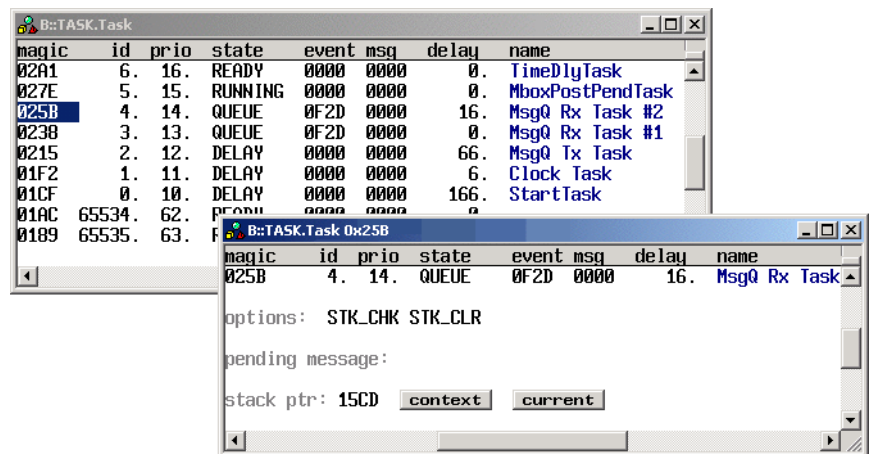
The $\tilde{\mu}$ C/OS-II awareness provides easy access to task lists and other kernel information, generates performance analysis data and enables you to do a most effective debugging with the TRACE32 systems on targets running $\tilde{\mu}$ C/OS-II.

RTOS Awareness on TRACE32 with μ C/OS-II

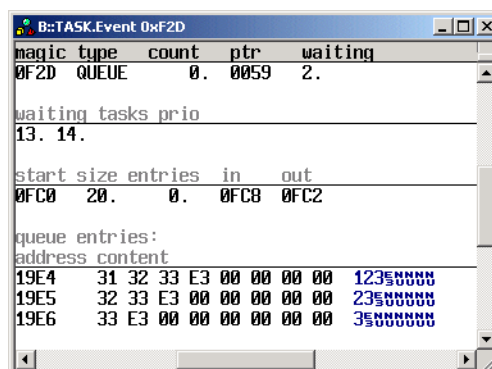
Real time, non-intrusive display of μ C/OS-II system resources

The TRACE32 RTOS debugger for μ C/OS-II provides display functions to show the system resources of μ C/OS-II. All objects, such as tasks, events, memory partitions etc. can be displayed and inspected. In addition, by using the processors capability of reading the target memory while the appli-

cation 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



Detailed window of an queue event entry

Task Related Breakpoints

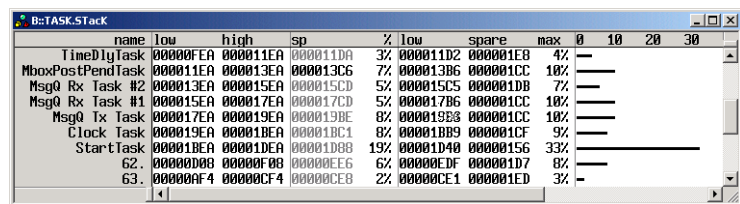
Any breakpoint set in the TRACE32 debugger can be set dependent to a specific task. This means, that the

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

Task 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 the stack of each separate task.



| name | low | high | sp | % | low | spare | max | 0 | 10 | 20 | 30 |
|------------------|----------|----------|----------|-----|----------|---------|-----|---|----|----|----|
| TimeDlyTask | 0000FEA | 00011EA | 000011DA | 3% | 000011D2 | 00001EB | 4% | | | | |
| MboxPostPendTask | 000011EA | 000013EA | 000013C6 | 7% | 000013B6 | 00001CC | 10% | | | | |
| Msg0 Rx Task #2 | 000013EA | 000015EA | 000015CD | 5% | 000015C5 | 00001DB | 7% | | | | |
| Msg0 Rx Task #1 | 000015EA | 000017EA | 000017CD | 5% | 000017B6 | 00001CC | 10% | | | | |
| Msg0 Tx Task | 000017EA | 000019EA | 000019BE | 8% | 000019B3 | 00001CC | 10% | | | | |
| Clock Task | 000019EA | 00001BEA | 00001BC1 | 8% | 00001BB9 | 00001CF | 9% | | | | |
| StartTask | 00001BEA | 00001DEA | 00001D88 | 19% | 00001D40 | 0000156 | 33% | | | | |
| 62. | 00001D88 | 00001F08 | 00001EE6 | 6% | 00001EDF | 00001D7 | 8% | | | | |
| 63. | 00001F08 | 00001F4 | 00001CE8 | 2% | 00001CE1 | 00001ED | 3% | | | | |

Task stack coverage window

Task Context Display

The TRACE32 RTOS debugger provides an easy way to 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 task was scheduled.

Dynamic Task Performance Measurement

While μ C/OS-II 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 dis-

played 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.

µC/OS specific display of trace listing

The data recorded in the real time trace buffer (if available) can be displayed and interpreted specific to the operat-

ing system. The task switches are displayed symbolically, either exclusively or in addition to other information.

```

record
  lda 0x003
  sta 0x004
  TASK prio = 62., magic = 01AC ---
  ldx 0x0FE
  ldx 0x1,X
  pulh
  txs
  pulh
  rti
}
753 OS_EXIT_CRITICAL();
754 cli
  pulh
  rts
}
51 ais #0x2
  rts
{
103 while (T32OUT) OSTimeDly (1);
  lda 0xFBF
  bne 0xE1DE
  clrX

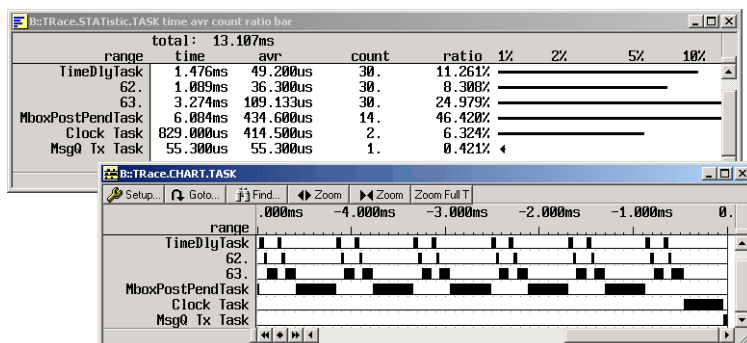
```

Trace listing, display of task switches, assembler and source lines

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.

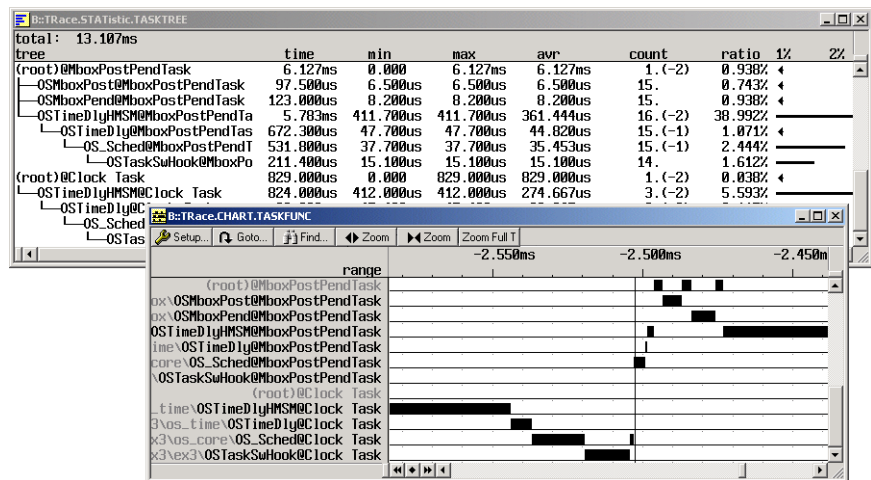


Statistics and flow of tasks

Task related evaluation of function run times

The statistic and graphic evaluation of function calls and function run times (if available) can be done dependent 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.

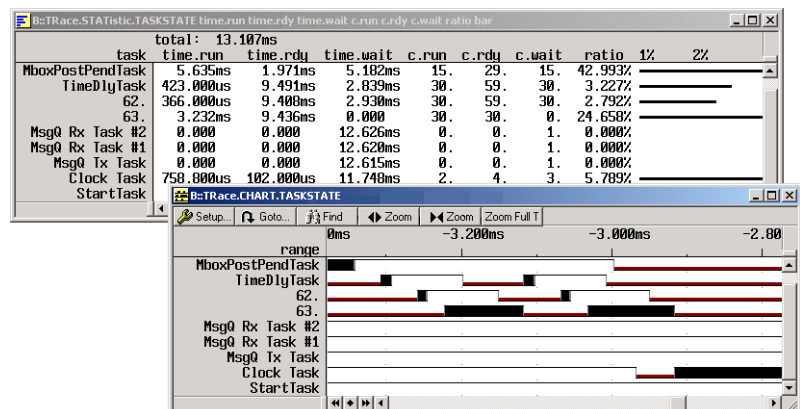


Function Tree Statistics and flow of task dependent function run times

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.

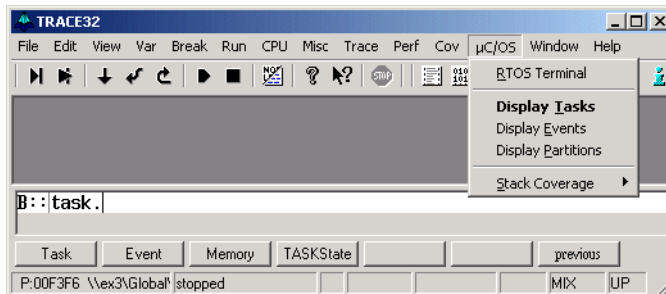
The support includes extended PRACTICE functions for μ C/OS-II specific data, to be used in setup and test scripts. E.g. the function "task.config

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

μ C/OS 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

μ C/OS-II support with an example for such specific menus, which provides fast access to the μ C/OS-II awareness features.



TRACE32 with μ C/OS-II menu

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