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## RTOS Debugger for FreeRTOS



**ARC**  
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**AVR32**  
**Beyond**  
**ColdFire**  
**H8S**  
**HC12**  
**MICROBLAZE**  
**MIPS**  
**POWERPC**

- Display of all FreeRTOS System Resources
- Task Related Breakpoints
- Task Stack Coverage
- Dynamic Thread Performance Measurement
- FreeRTOS Specific Display of Trace Listing
- Statistic Evaluation and Graphic Display of Task Run Times
- Statistic Evaluation and Graphic Display of Function Run Times
- PRACTICE Functions for OS Data
- FreeRTOS 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 FreeRTOS Real Time Kernel.

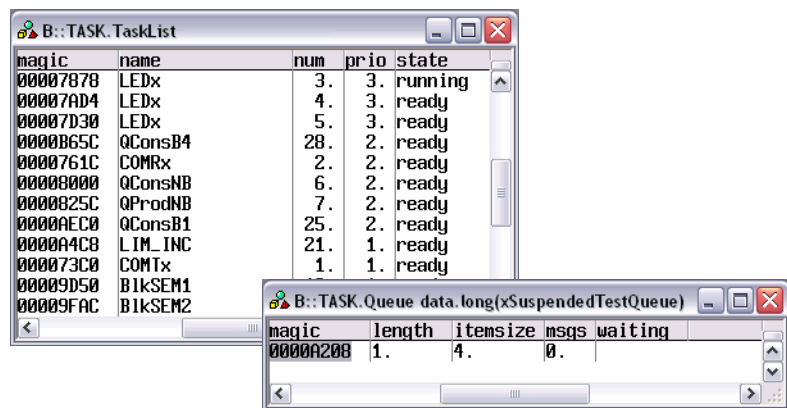
The FreeRTOS awareness provides easy access to task lists and other kernel information, generates performance analysis data and enables you to do a most effective debugging with the TRACE32 systems on targets running FreeRTOS.

## RTOS Awareness on TRACE32 with FreeRTOS

### Real Time, Non-Intrusive Display of FreeRTOS System Resources

The TRACE32 RTOS debugger for FreeRTOS provides display functions to show the system resources of FreeRTOS. All objects, such as tasks and queues can be displayed and inspected. 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.

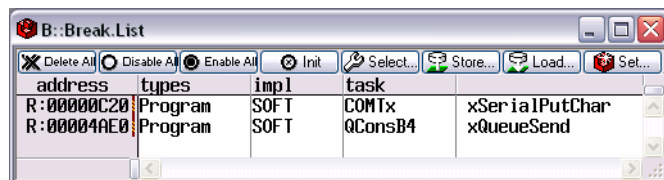


Task list window and detailed queue window

### 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.

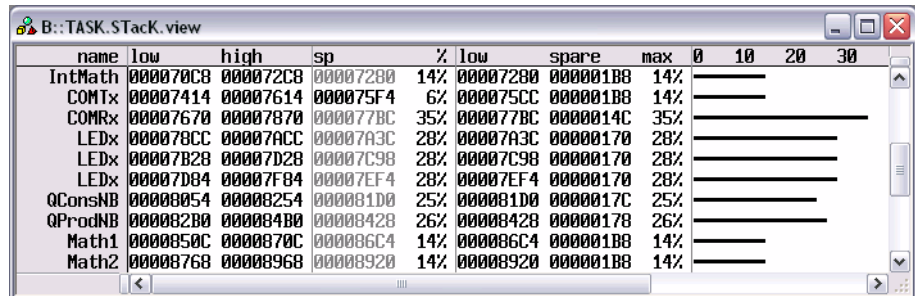


Breakpoint list with task dependent breakpoints

## 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 the stack of each separate task

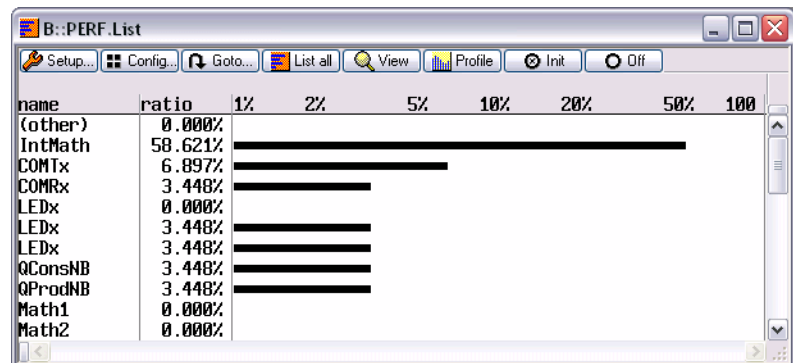


Task stack coverage window

## Dynamic Task Performance Measurement

While FreeRTOS 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.



Performance measurement list

## FreeRTOS 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.

```

[B::Trace.List List.TASK Default /Track]
record run address cycle data symbol ti.back
545                                     pxCurrentTCB = pxNewTCB;
-000225 ldr r2,0x3390 D:00003390 rd-long 00006F64 ..o\tasks\TaskCreate+0x224 0.200us
-000223 ldr r3,[r11,#-0x281 D:0003FB9C rd-long 00007AD4 ..lobal\_bss_end\_+0x3270C 0.200us
-000221 str r3,r21 TASK magic = 00007AD4 name = LEDx ---
D:00006F64 wr-long 00007AD4 ..sdemo\Global\pxCurrentTCB 0.100us
}
}
}
/* Remember the top priority to make context switch
the priority in pxNewTCB as this has been capped to
if( pxNewTCB->uxPriority > uxTopUsedPriority )
552 ldr r3,[r11,#-0x281
-000219 D:0003FB9C rd-long 00007AD4 ..lobal\_bss_end\_+0x3270C 0.200us
ldr r2,0x3390

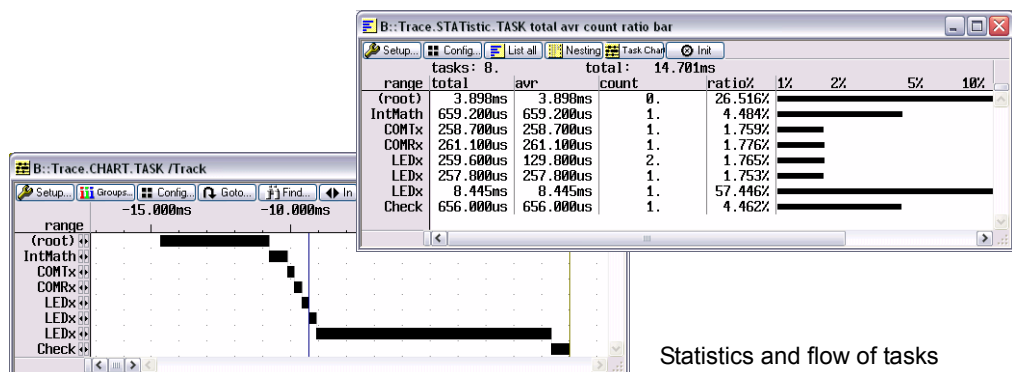
```

Trace listing, task switch, 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

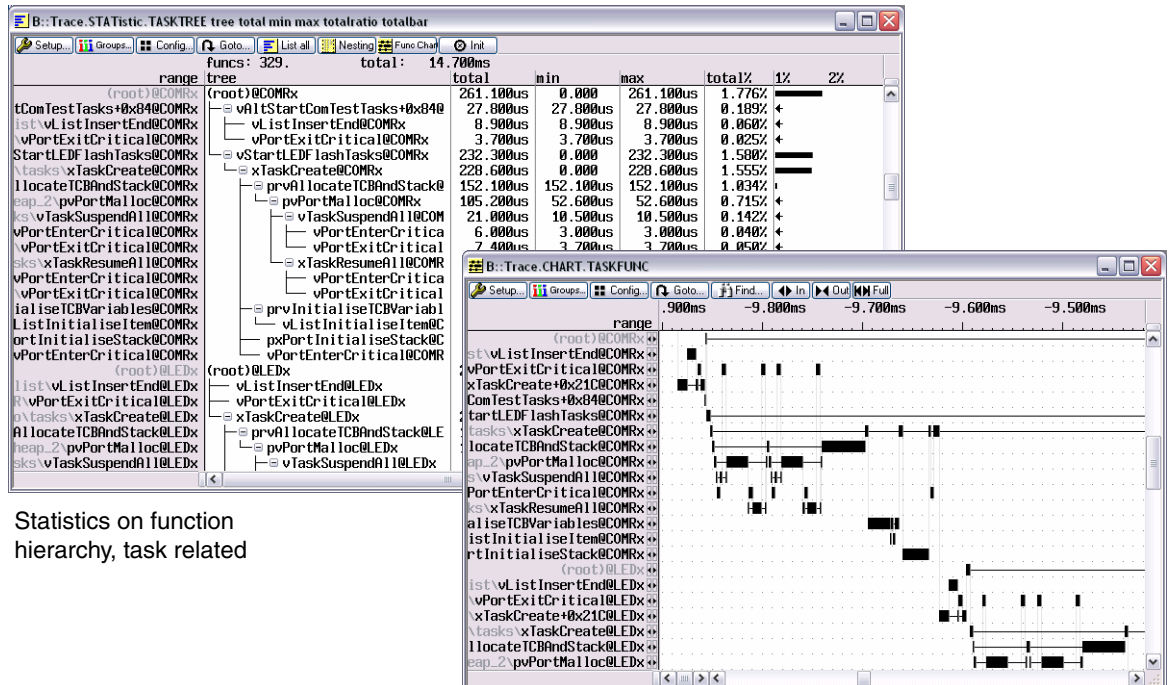
which task was active at a specific time, giving a clear view of the behaviour of the system.



## 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

## PRACTICE Functions for OS Data.

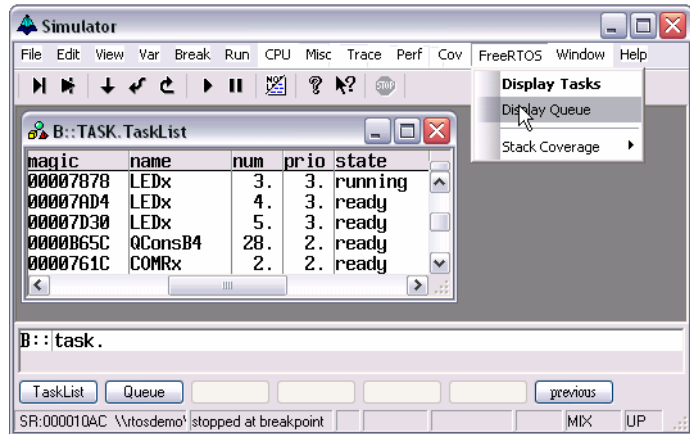
The support includes extended PRACTICE functions for FreeRTOS specific data, to be used in setup and test scripts. E.g. the function "task.con-

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

## FreeRTOS 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

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



TRACE32 with FreeRTOS menu

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## Disclaimer

The information presented is intended to give overview information only. Changes and technical enhancements or modifications can be made without notice.

