

RTOS Debugger for OS21

ST40

- Real Time, Non-Intrusive Display of OS21 System Resources
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The TRACE32 System includes a configurable multitask debugger to provide symbolic debugging in real time operating systems. Our software package contains a ready-to-run configuration for the OS21 Real Time Operating System from STMicroelectronics

The OS21 awareness provides easy access to task lists and other kernel information, generates performance analysis data and enables you to do a most effective

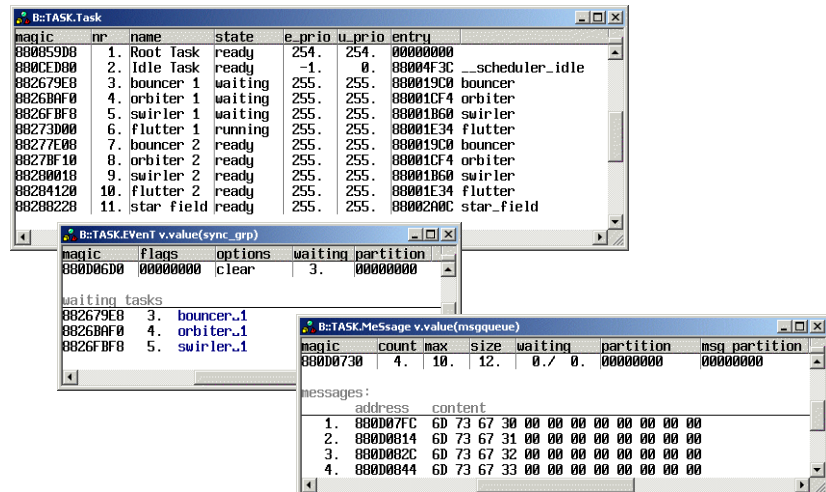
debugging with the TRACE32 systems on targets running OS21

Multitask Debugging on TRACE32 with OS21

Real Time, Non-Intrusive Display of OS21 System Resources

The TRACE32 multitask debugger for OS21 provides display functions to show the system resources of OS21. All objects, such as tasks, event groups, semaphores etc. can be displayed and inspected. In addition, 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.

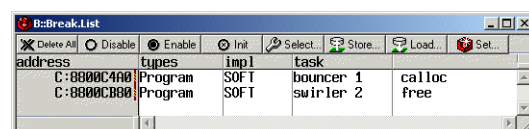


Task list window, detailed windows of an event group and a message queue

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

name	low	high	sp	%	low	spare	max	0	10	20
Root Task			8EFFFE20							
Idle Task	880CEE80	880CF680	880CF5A0	10%	880CF5A0	00000720	10%			
bouncer 1	88267AE8	8826BAE8	8826B99C	2%	8826B710	00003C28	6%			
orbiter 1	8826BBF0	8826FBF0	8826FA90	2%	8826F818	00003C28	6%			
swirler 1	8826FCF8	88273CF8	88273B94	2%	88273920	00003C28	6%			
flutter 1	88273E00	88277E00	88277D84	0%	88277A20	00003C28	6%			
bouncer 2	88277F08	8827BF08	8827BD8C	2%	8827BB30	00003C28	6%			
orbiter 2	8827C010	88280010	8827FE80	2%	8827FC38	00003C28	6%			
swirler 2	88280118	88284118	88283FB4	2%	88283D40	00003C28	6%			
Flutter 2	88284220	88288220	882880D4	2%	88287E48	00003C28	6%			

Task stack coverage window

Task Context Display

The TRACE32 Multitask 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 Task Performance Measurement

While OS21 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.

name	ratio	1%	2%	5%	10%	20%	50%	100%	
(other)	0.000%								
Root Task	81.573%								
Idle Task	0.000%								
bouncer 1	0.000%								
orbiter 1	0.877%								
swirler 1	1.754%								
Flutter 1	0.877%								
bouncer 2	0.000%								
orbiter 2	1.754%								
swirler 2	2.632%								
Flutter 2	0.877%								
star field task	9.649%								

Performance measurement list

OS21 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 List.Asm List.HLL
record
/*
 * Swap the active task!
 */
387 _active_taskp = request_taskp;
   mov.l 0x00004FE0,pc,r1
   mov.l r4,0,r1
388 } TASK magic = 00200220 name = star field task ---
   mov r14,r15
   rts
   mov.l 0r15+,r14
   mov r15,r4
   mov.l 0x000096D0,pc,r0
   jsr 0r0
   mov #0x0,r5

/*
 * This is called to tell the scheduler exception/interrupt handling is
 * about to complete.
 */
unsigned int *_scheduler_exit_sys (unsigned int * stackp, int is_interrupt)

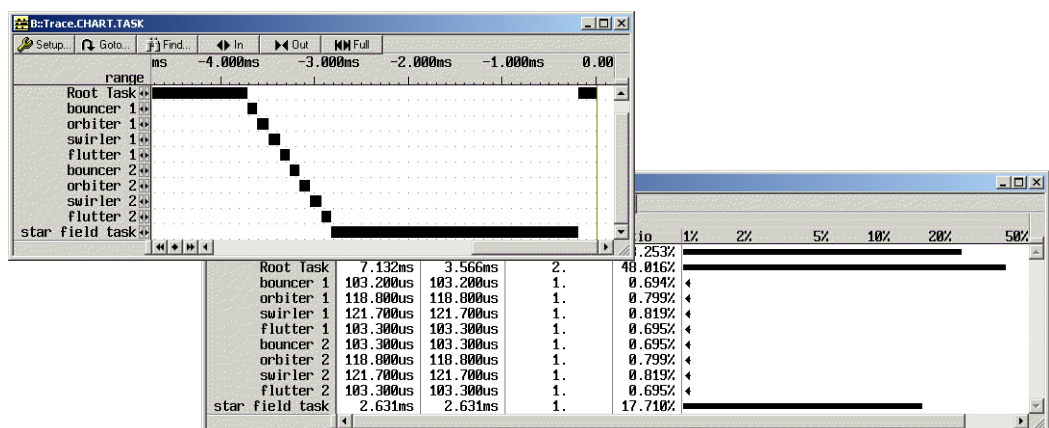
```

Trace listing, task switch, 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.

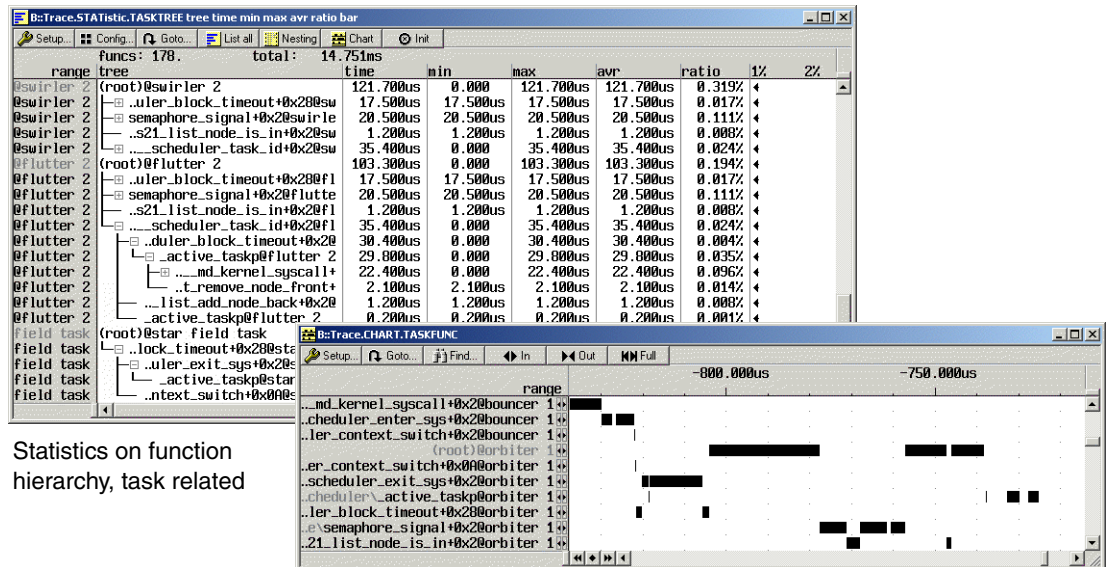


Statistics and flow of tasks

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.



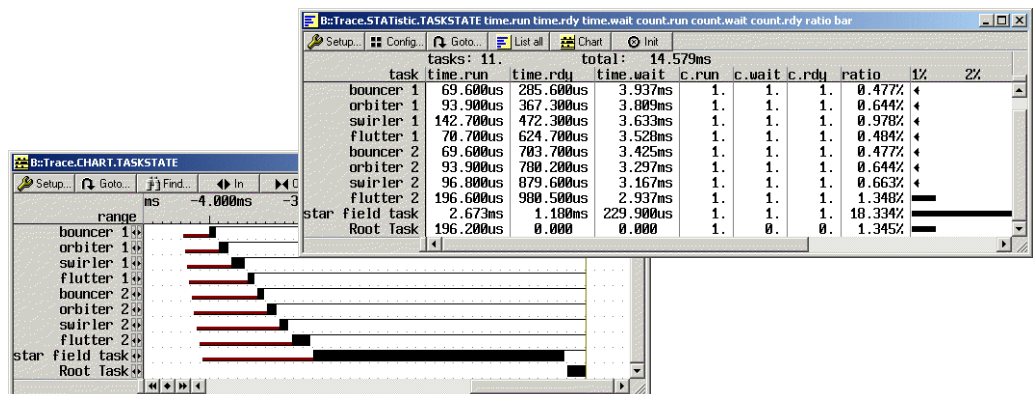
Statistics on function hierarchy, task related

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 the 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

PRACTICE Functions for OS Data.

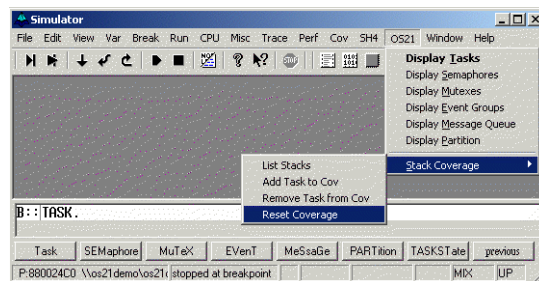
The support includes extended PRACTICE functions for OS21 specific data, to be used in setup and test scripts. E.g. the function “task.config(magic)”

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

OS21 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

OS21 support with an example for such specific menus, which provides fast access to the OS21 awareness features.



TRACE32 with OS21 menu

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