



RTOS Debugger for MQX

680x0

683xx

ARM

PowerPC

- Real time, non-intrusive display of MQX system resources
- MQX specific display of analyzer listing
- Statistic evaluation and graphic display of task run times
- Task related evaluation of function run times
- Statistic evaluation and graphic display of task states
- Task stack coverage
- PRACTICE functions for OS data
- MQX related pull-down menu

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 MQX Real Time Kernel from MQX Embedded.

Multitask Debugging on TRACE32 with MQX

Real time, non-intrusive display of MQX system resources

The TRACE32 multitask debugger for MQX provides display functions for all MQX resources. The system resources tasks, messages, semaphores, mutexes and events can be displayed. In addition, by using the emulators

dual-port memory, 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.

The screenshot shows two windows from the TRACE32 multitask debugger. The top window, titled "E::task.task", displays a list of system tasks. The bottom window, titled "E::TASK.TASK 'Sender'", provides a detailed view of the "Sender" task.

magic	name	id	state	prio	msgs
000011B0	_LTM	00010001	Rcv Any Blocked	5.	0.
00001230	_Idle	00010002	Ready	11.	0.
000012B0	Main	00010003	Rcv Any Blocked	8.	0.
00001330	Sender	00010004	Active	10.	1.
000013B0	Responder	00010005	Rcv Any Blocked	9.	0.

magic	name	id	state	prio	msgs
00001330	Sender	00010004	Active	10.	1.

father SR disabled boost message timeout timeslice error
 00010003 2000 0. 0. 00003E90 0. 0. 0000 / 0032 OK

Template:
 index entry parameter prio stkslice timeslice
 0000000C 0000E6D2 00000000 10. 0000012C 0000

Attributes: NO AUTO_START, NO FLOATING_POINT, NO TIME_SLICE

Task Status list window and detailed window of one specific task

The screenshot shows two windows from the TRACE32 multitask debugger. The top window, titled "E::TASK.MSG.POOL", displays an overview of message pools. The bottom window, titled "E::TASK.MSG.POOL 1D08", provides a detailed view of the message pool with magic 00001D08, including a list of messages in the queue.

magic	size	total	free	grow	limit	type	valid
00001CE8	003C	16.	16.	8.	24.	named	yes
00001D08	0020	2.	1.	0.	2.	named	yes

magic	size	total	free	grow	limit	type	valid
00001D08	0020	2.	1.	0.	2.	named	yes

messages in queue:

magic	status	valid	message	size	target	p/q	source	p/q
00003E78	queued	yes	00003E90	0020	01	/ 28	01	/ 0A
00003EB0	free	yes	00003ECB	0000	00	/ 00	00	/ 00

Overview and detailed window of message pools

MQX specific display of analyzer listing

The data recorded in the analyzer can be displayed and interpreted specific to the operating system. The task switches can be displayed symbolically.

```

E::a.1 run address cycle data symbol l.task l.asm l.nofetch
-----
record run address      cycle d.w symbol
-----
+004859 f | TASK = 00010005 , Responder
+004860 f | SD:00001008 wr-word 0000
+004860 f | SD:0000100A wr-word 13B0
+004862 f | TASK = 00010004 , Sender
+004863 f | SD:00001008 wr-word 0000
+004863 f | SD:0000100A wr-word 1330
+004865 f | SD:00001300 rd-word 2000
+004866 f | SD:00001006 wr-word 2000
+004869 f | movea.l 14(a3),a7
+004870 f | SD:00001344 rd-word 0000
+004870 f | SD:00001346 rd-word 3F64
+004874 f | btst #0,1597(a2)
+004874 f | SD:00001997 rd-byte 00
+004874 f | beq 0A0A8
+004880 f | movem.l (a7)+,[d0-d7,a0-a6]
+004881 f | SD:00003F64 rd-word 0000
+004881 f | SD:00003F66 rd-word 0400
+004882 f | SD:00003F68 rd-word 0000
+004883 f | SD:00003F6A rd-word 0000
+004884 f | SD:00003F6C rd-word 0000
  
```

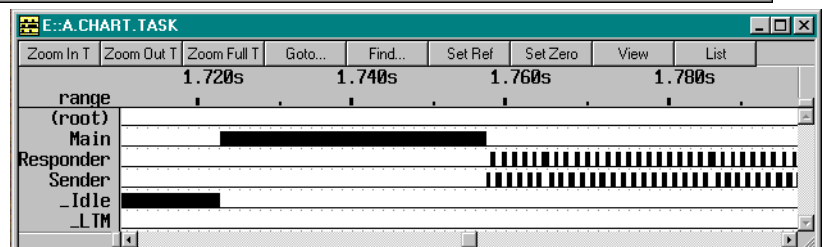
Analyzer listing, task selective recording, display of task switches, assembler mnemonics and data accesses

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.

range	total: 3.403s	time	avr	count	ratio	1%	2%	5%
_Idle	1.667s	833.730ms	2.	49.002%				
Sender	855.548ms	687.740us	1244.	25.142%				
Responder	792.722ms	637.749us	1243.	23.295%				
Main	79.946ms	26.649ms	3.	2.349%				
_LTM	7.017ms	2.339ms	3.	0.206%				
(root)	155.750us	155.750us	1.	0.004%				



Statistics and flow of tasks

Task related evaluation of function run times

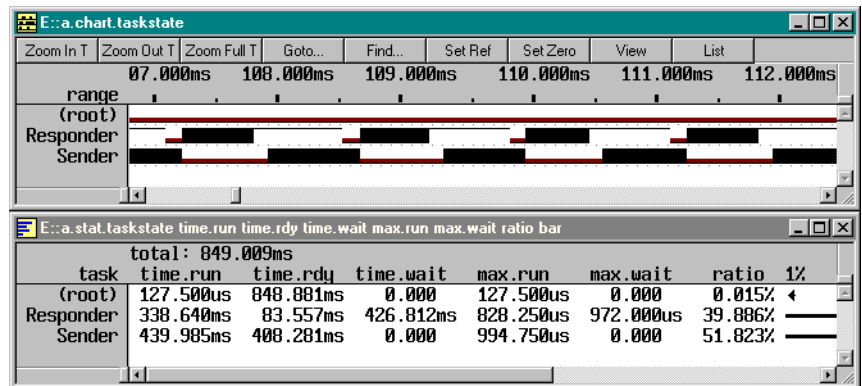
The statistic and graphic evaluation of function calls and function run times can be done dependant to the actual running task. This is necessary, if dif-

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

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 the data can help to highlight prioritisation problems, critical paths etc.



Statistics and flow of task states

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.

The screenshot shows the 'E::TASK_STK' window, which displays a table of stack coverage for different tasks. The table includes columns for magic, bottom, top, sp(stk), sp(req), curr, max, and usage. The usage is represented by a bar chart for each task.

magic	bottom	top	sp(stk)	sp(req)	curr	max	usage
_LTM	00003370	00002E70	000032CA		13%		—
_Idle	00003B20	000039C4	00003AD0		23%		—
Main	00003E54	00003B34	00003D78		27%	00003CF4	44%
Sender	00004028	00003EFC	00003F64	00003FAB	42%	00003F64	65%
Responder	00004168	0000403C	000040C8		53%	000040C8	53%

Task stack coverage window

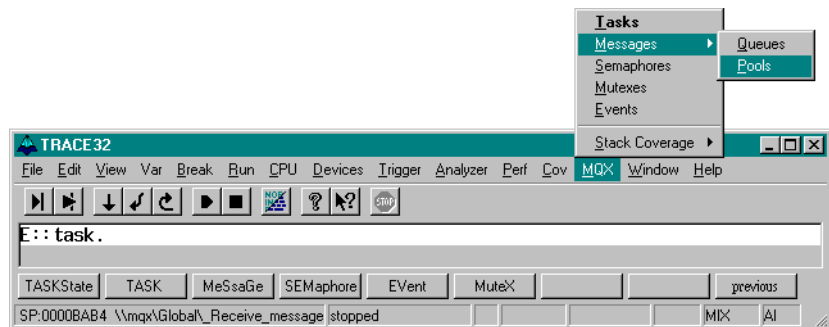
PRACTICE functions for OS data.

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

MQX 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

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



TRACE32 with MQX menu

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