



RTOS Debugger for OSE Epsilon

68HC11
ARM
XSCALE
C167

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

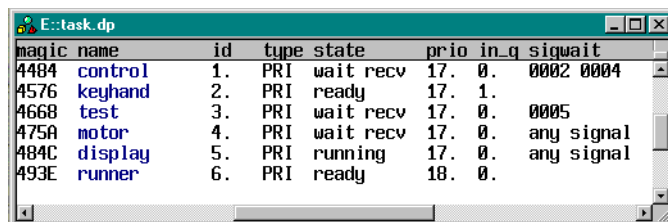
The TRACE32 System includes a configurable multitask debugger to provide symbolic debugging in real time operating systems. Our software package contains a ready-to-run configuration for the OSE Epsilon Real Time Kernel from Enea OSE Systems.

Multitask Debugging on TRACE32 with OSE Epsilon

Real time, non-intrusive display of OSE Epsilon system resources

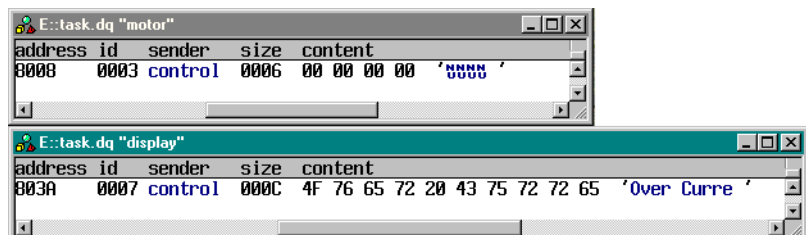
The TRACE32 multitask debugger for OSE Epsilon provides display functions, closely mirroring the command set of the OSE System Debugger. The system resources such as process list and signal queues can be displayed. In addition, by using the emulators dual-

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.



magic	name	id	type	state	prio	in_q	sigwait
4484	control	1.	PRI	wait rcv	17.	0.	0002 0004
4576	keyhand	2.	PRI	ready	17.	1.	
4668	test	3.	PRI	wait rcv	17.	0.	0005
475A	motor	4.	PRI	wait rcv	17.	0.	any signal
484C	display	5.	PRI	running	17.	0.	any signal
493E	runner	6.	PRI	ready	18.	0.	

Process list window



address	id	sender	size	content
0008	0003	control	0006	00 00 00 00 'NNNN'

address	id	sender	size	content
003A	0007	control	000C	4F 76 65 72 20 43 75 72 72 65 'Over Curre'

Signal queue window and detailed signal description

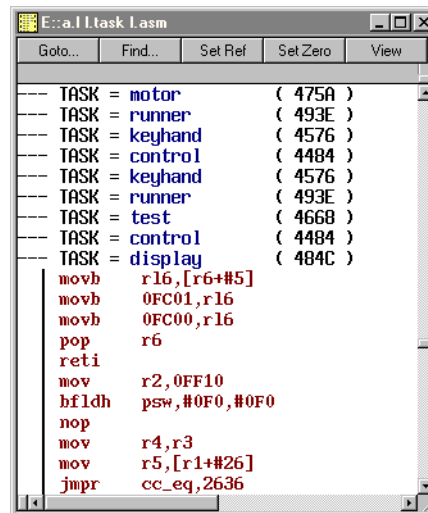
Manual executed system calls

In OSE Epsilon it is possible to execute system calls, initiated with PRACTICE from the TRACE32 surface. This technique can be used, for example, to set

specific signals, to suspend processes or simulate some other special condition.

OSE Epsilon specific display of analyzer listing

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



```

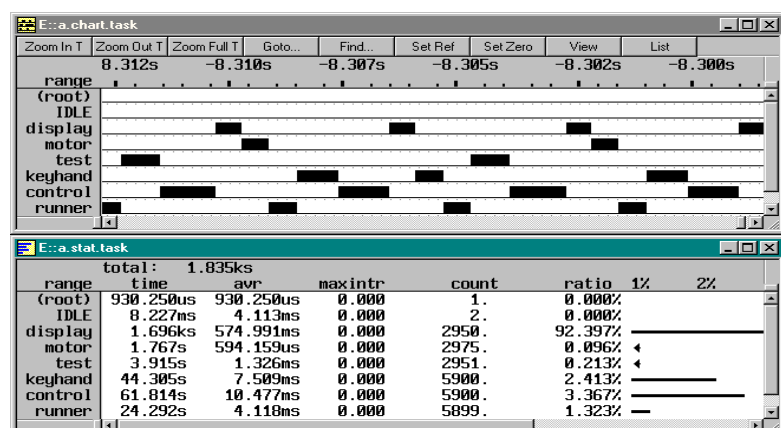
E::a.l.task.asm
Goto... Find... Set Ref Set Zero View
--- TASK = motor      ( 475A )
--- TASK = runner    ( 493E )
--- TASK = keyhand   ( 4576 )
--- TASK = control   ( 4484 )
--- TASK = keyhand   ( 4576 )
--- TASK = runner    ( 493E )
--- TASK = test      ( 4668 )
--- TASK = control   ( 4484 )
--- TASK = display   ( 484C )
movb  r16,[r6+#5]
movb  0FC01,r16
movb  0FC00,r16
pop   r6
reti
mov   r2,0FF10
bfl dh psw,#0F0,#0F0
nop
mov   r4,r3
mov   r5,[r1+#26]
jmp  cc_eq,2636
  
```

Analyzer listing, task selective recording, display of task switches and assembler

Statistic evaluation and graphic display of process run times

The analyzer can calculate statistic tables of process run times and process switches. A graphical diagram

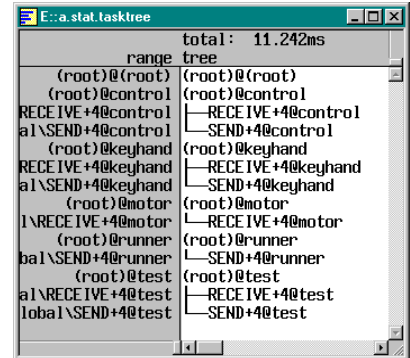
shows which process was active at a specific time, giving a clear view of the behaviour of the system.



Statistics and flow of processes

Process 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 process. This is necessary, if different processes call one single function at the same time, or if a process switch occurs in between the function.



Function hierarchy statistics

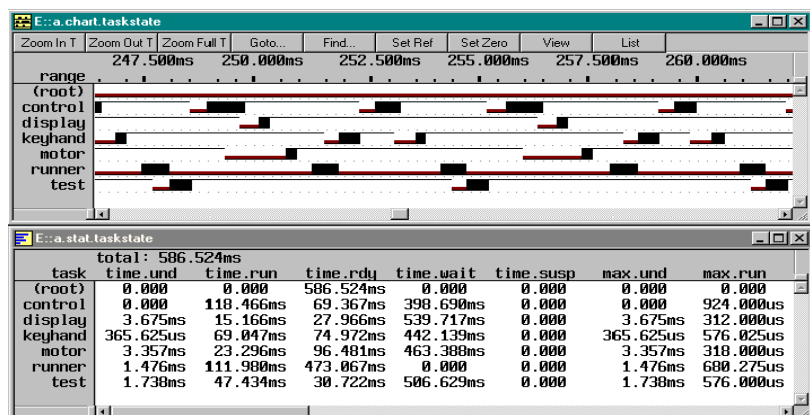
range	total: 11.242ms	time	min	max	avr	count	ratio	1%	2%	5%	1
(root)@(root)	354.775us	0.000	354.775us	354.775us	354.775us	1.(-2)	3.155%				
(root)@control	3.209ms	0.000	3.209ms	3.209ms	3.209ms	1.(-2)	6.393%				
(root)@keyhand	2.305ms	0.000	2.305ms	2.305ms	2.305ms	1.(-2)	3.695%				
(root)@motor	1.160ms	0.000	1.160ms	1.160ms	1.160ms	1.(-2)	1.950%				
(root)@runner	2.476ms	0.000	2.476ms	2.476ms	2.476ms	1.(-2)	2.365%				
(root)@test	1.736ms	0.000	1.736ms	1.736ms	1.736ms	1.(-2)	2.832%				
RECEIVE+4@control	1.663ms	456.250us	469.025us	332.610us	5.(-2)	14.792%					
RECEIVE+4@keyhand	1.477ms	472.750us	536.075us	369.368us	4.(-2)	13.142%					
RECEIVE+4@motor	941.025us	470.500us	470.500us	313.675us	3.(-2)	8.370%					
RECEIVE+4@runner	1.005ms	536.900us	536.900us	335.175us	3.(-2)	8.944%					
RECEIVE+4@test	827.500us	200.850us	212.900us	206.875us	4.	7.360%					
SEND+4@control	412.250us	206.125us	206.125us	206.125us	2.	3.667%					
SEND+4@keyhand	2.210ms	533.500us	598.900us	442.100us	5.(-2)	19.662%					
SEND+4@motor	412.275us	206.125us	206.150us	206.137us	2.	3.667%					

Statistics on function run times

Statistic evaluation and graphic display of process states

These tabular and graphical analyses of the status of processes show the various states (i.e. running, ready, waiting, suspended and undefined) and times each process spent in each

state. A graphical view of the data can help to highlight prioritisation problems, critical paths etc.

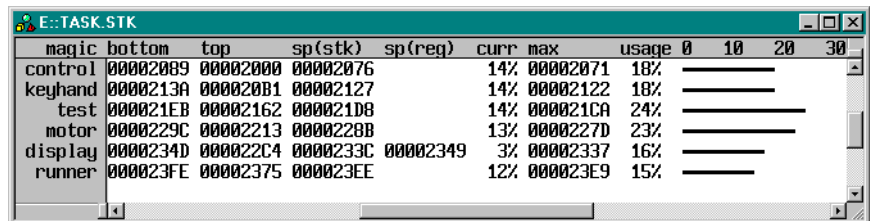


Statistics and flow of process states

Task Stack Coverage

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

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



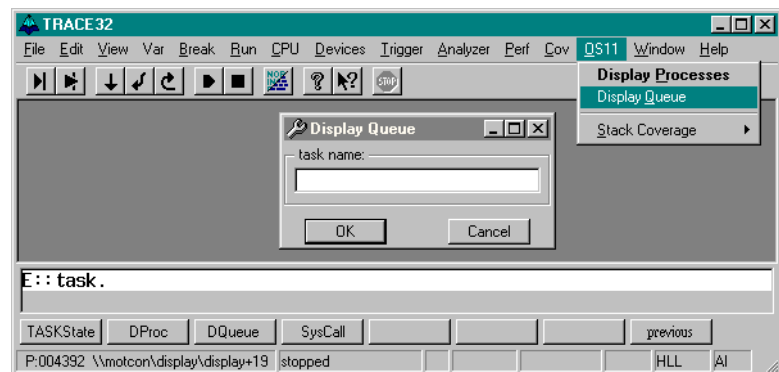
magic	bottom	top	sp(stk)	sp(req)	curr	max	usage	0	10	20	30
control	00002089	00002000	00002076		14%	00002071	18%	[Progress bar]			
keyhand	0000213A	000020B1	00002127		14%	00002122	18%	[Progress bar]			
test	000021EB	00002162	000021D8		14%	000021CA	24%	[Progress bar]			
motor	0000229C	00002213	0000228B		13%	0000227D	23%	[Progress bar]			
display	0000234D	000022C4	0000233C	00002349	3%	00002337	16%	[Progress bar]			
runner	000023FE	00002375	000023EE		12%	000023E9	15%	[Progress bar]			

Process stack coverage

OSE Epsilon 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

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



TRACE32 with OSE Epsilon menu

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.

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