



RTOS Debugger for ARTK

680x0

683xx

- Real time, non-intrusive display of ARTK system resources
- ARTK 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
- ARTK related pull-down menu

The TRACE32 systems include a configurable multitask debugger to provide symbolic debugging in real time operating systems. Our software package contains a ready-to-run configuration for the AdaWorld Ada Run Time Kernel (ARTK) from Aonix.

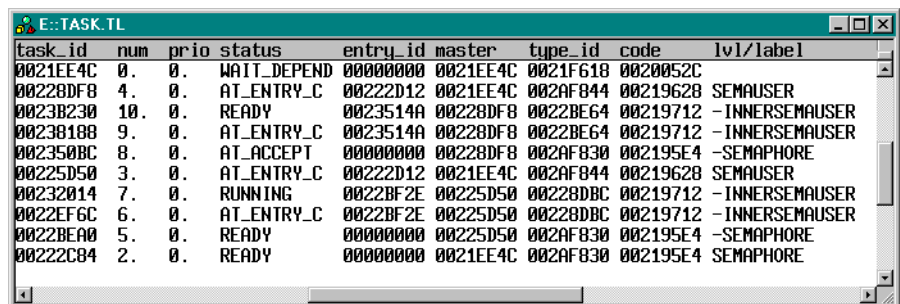
In close cooperation with Aonix we built a special multi-task support for ARTK on Motorola 68k processors.

Multitask Debugging on TRACE32 with AdaWorld ARTK

Real time, non-intrusive display of ARTK system resources

The TRACE32 multitask debugger for ARTK provides display functions to display the system tasks. In addition, by using the emulators dual-port memory, the display of the tasks can be viewed

non-intrusively in real time. The tables are updated permanently ("On The Fly"), without affecting the application at all.



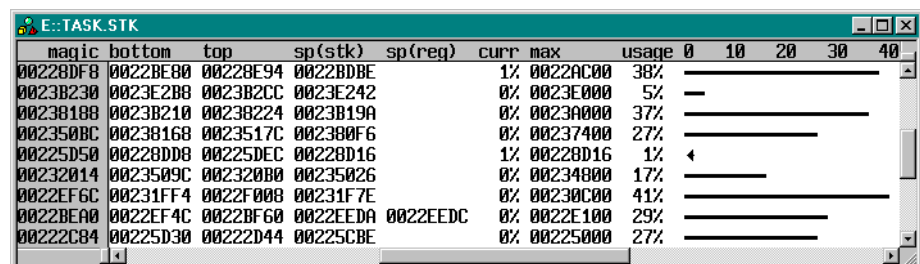
task_id	num	prio	status	entry_id	master	type_id	code	lvl/label
0021EE4C	0	0	WAIT_DEPEND	00000000	0021EE4C	0021F618	0020052C	
00228DF8	4	0	AT_ENTRY_C	00222D12	0021EE4C	002AF844	00219628	SEMAUSER
0023B230	10	0	READY	0023514A	00228DF8	0022BE64	00219712	-INNERSEMAUSER
00238188	9	0	AT_ENTRY_C	0023514A	00228DF8	0022BE64	00219712	-INNERSEMAUSER
002350BC	8	0	AT_ACCEPT	00000000	00228DF8	002AF830	002195E4	-SEMAPHORE
00225D50	3	0	AT_ENTRY_C	00222D12	0021EE4C	002AF844	00219628	SEMAUSER
00232014	7	0	RUNNING	0022BF2E	00225D50	00228DBC	00219712	-INNERSEMAUSER
0022EF6C	6	0	AT_ENTRY_C	0022BF2E	00225D50	00228DBC	00219712	-INNERSEMAUSER
0022BEA0	5	0	READY	00000000	00225D50	002AF830	002195E4	-SEMAPHORE
00222C84	2	0	READY	00000000	0021EE4C	002AF830	002195E4	SEMAPHORE

Task list window

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.



magic	bottom	top	sp(stk)	sp(req)	curr	max	usage	0	10	20	30	40
00228DF8	0022BE80	00228E94	0022BDBE		1%	0022AC00	38%	[Progress bar]				
0023B230	0023E2B8	0023B2CC	0023E242		0%	0023E000	5%	[Progress bar]				
00238188	0023B210	00238224	0023B19A		0%	0023A000	37%	[Progress bar]				
002350BC	00238168	0023517C	002380F6		0%	00237400	27%	[Progress bar]				
00225D50	00228DD8	00225DEC	00228D16		1%	00228D16	1%	[Progress bar]				
00232014	0023509C	002320B0	00235026		0%	00234800	17%	[Progress bar]				
0022EF6C	00231FF4	0022F008	00231F7E		0%	00230C00	41%	[Progress bar]				
0022BEA0	0022EF4C	0022BF60	0022EEDA	0022EEDC	0%	0022E100	29%	[Progress bar]				
00222C84	00225D30	00222D44	00225CBE		0%	00225000	27%	[Progress bar]				

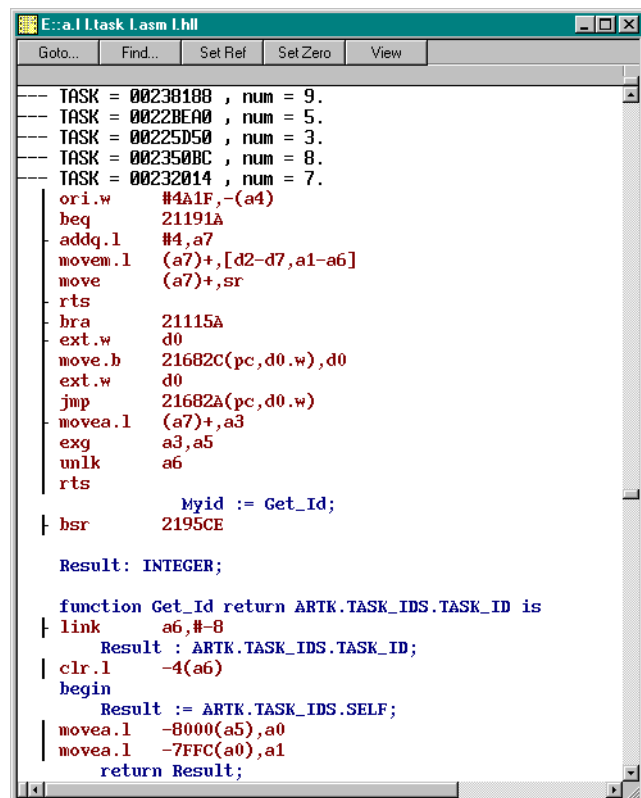
Task stack coverage window

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.

ARTK specific display of analyzer listing

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



```

--- TASK = 00238188 , num = 9.
--- TASK = 0022BEA0 , num = 5.
--- TASK = 00225D50 , num = 3.
--- TASK = 002350BC , num = 8.
--- TASK = 00232014 , num = 7.
|
| ori.w    #4A1F,-(a4)
| beq     21191A
| addq.l  #4,a7
| movem.l (a7)+,[d2-d7,a1-a6]
| move    (a7)+,sr
| rts
| bra     21115A
| ext.w   d0
| move.b  21682C(pc,d0.w),d0
| ext.w   d0
| jmp     21682A(pc,d0.w)
| movea.l (a7)+,a3
| exg     a3,a5
| unlk    a6
| rts
|
| Myid := Get_Id;
| bsr     2195CE
|
| Result: INTEGER;
|
| function Get_Id return ARTK.TASK_IDS.TASK_ID is
| link    a6,#-8
|         Result : ARTK.TASK_IDS.TASK_ID;
| clr.l   -4(a6)
| begin
|         Result := ARTK.TASK_IDS.SELF;
| movea.l -8000(a5),a0
| movea.l -7FFC(a0),a1
|         return Result;

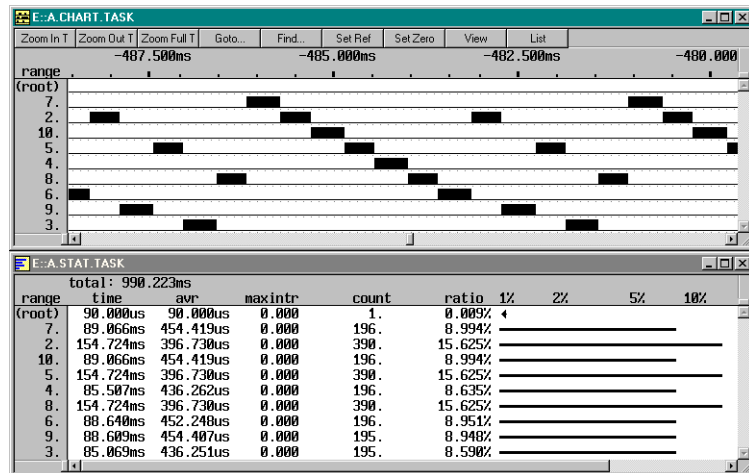
```

Analyzer listing, task selective recording, display of task switches, assembler mnemonics and HLL lines

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.

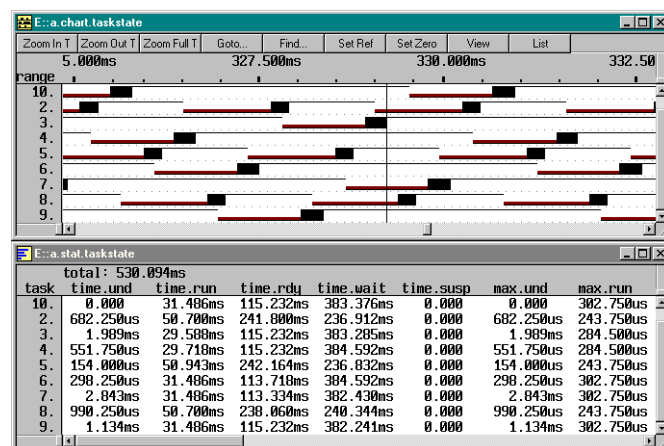


Statistics and flow of tasks

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 related evaluation of function run times

The statistic and graphic evaluation of function calls and function run times can be done dependant on 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.

record	func	ti	fore	address	cycle	d.w
TASK = 00238180 , num = 9.						
+009879		0.500us	SD	:0021ED60	wr-word	0023
+009880		50.750us	SD	:0021ED62	wr-word	8180
+009881	GET_ID+2	0.000us	SP	:002195D0	rd-word	FFF8
+009882		0.500us	SD	:0021ED60	rd-word	0023
+009883		1.000us	SD	:0021ED62	rd-word	8180
+009884	GET_ID+14	142.250us	SP	:002195E2	rd-word	4E75
+009885	GET_ID+2	0.000us	SP	:002195D0	rd-word	FFF8
+009886		0.500us	SD	:0021ED60	rd-word	0023
+009887		1.000us	SD	:0021ED62	rd-word	8180
+009888	GET_ID+14	4.000us	SP	:002195E2	rd-word	4E75
+009889	INNERSEMAUSER+66	3.250us	SP	:00219778	rd-word	60C2
+009890	INNERSEMAUSER+2E	230.500us	SP	:00219740	rd-word	43EE
+009891		0.500us	SD	:0021ED60	rd-word	0023
+009892		6.000us	SD	:0021ED62	rd-word	8180
TASK = 0022BEA0 , num = 5.						
+009893		0.500us	SD	:0021ED60	wr-word	0022
+009894		47.000us	SD	:0021ED62	wr-word	BEA0
+009895	GET_ID+2	0.000us	SP	:002195D0	rd-word	FFF8
+009896		0.500us	SD	:0021ED60	rd-word	0022
+009897		1.000us	SD	:0021ED62	rd-word	BEA0
+009898	GET_ID+14	5.500us	SP	:002195E2	rd-word	4E75
+009899	SEMAPHORE+32	133.000us	SP	:00219616	rd-word	266D
+009900	SEMAPHORE+42	195.750us	SP	:00219626	rd-word	60E4

Analyzer listing, function call hierarchy and task switches

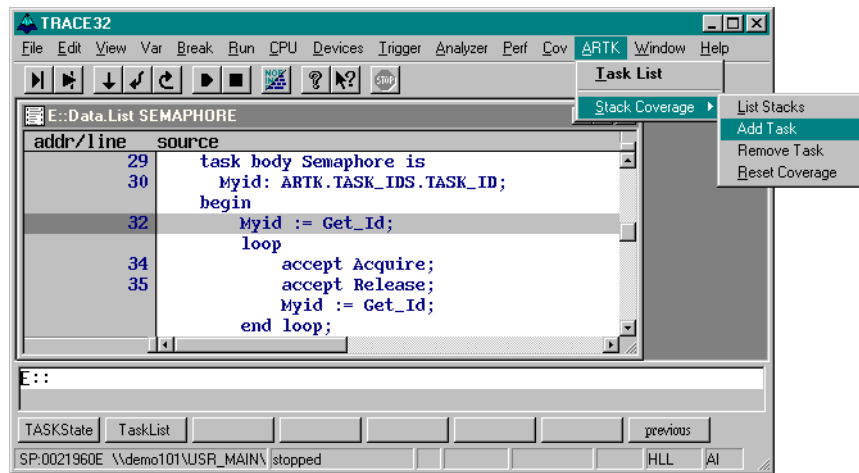
range	tree	time	min	max	avr
total: 374.161ms					
(root)010	(root)010	33.799ms	0.000	33.799ms	33.799ms
\INNERSEMAUSER+2E010	└─INNERSEMAUSER+2E010	33.559ms	453.500us	453.500us	447.453us
MAIN\DEMO\GET_ID+2010	└─└─GET_ID+2010	1.406ms	9.500us	9.500us	9.500us
(root)02	(root)02	58.469ms	0.000	58.469ms	58.469ms
\DEMO\SEMAPHORE+3202	└─SEMAPHORE+3202	19.551ms	133.000us	133.000us	133.000us
MAIN\DEMO\GET_ID+202	└─└─GET_ID+202	1.396ms	9.500us	9.500us	9.500us
(root)03	(root)03	32.010ms	0.000	32.010ms	32.010ms
\DEMO\SEMAUSER+0C203	└─SEMAUSER+0C203	21.389ms	293.000us	293.000us	289.040us
MAIN\DEMO\GET_ID+203	└─└─GET_ID+203	693.500us	9.500us	9.500us	9.500us
(root)04	(root)04	32.449ms	0.000	32.449ms	32.449ms
\DEMO\SEMAUSER+0C204	└─SEMAUSER+0C204	21.682ms	293.000us	293.000us	289.093us
MAIN\DEMO\GET_ID+204	└─└─GET_ID+204	703.000us	9.500us	9.500us	9.500us
(root)05	(root)05	58.469ms	0.000	58.469ms	58.469ms
\DEMO\SEMAPHORE+3205	└─SEMAPHORE+3205	19.551ms	133.000us	133.000us	133.000us
MAIN\DEMO\GET_ID+205	└─└─GET_ID+205	1.396ms	9.500us	9.500us	9.500us
(root)06	(root)06	33.555ms	0.000	33.555ms	33.555ms
\INNERSEMAUSER+2E06	└─INNERSEMAUSER+2E06	33.310ms	453.500us	453.500us	450.243us
MAIN\DEMO\GET_ID+206	└─└─GET_ID+206	1.406ms	9.500us	9.500us	9.500us

Statistics on function hierarchy, task related

ARTK 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 sys-

tem specific commands. We deliver ARTK support with an example for such specific menus, which provides fast access to the ARTK features.



TRACE32 with AdaWorld ARTK menu

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