

RTOS-Link™

Real-Time Development, Debug and Measurement for pSOS+

Applied Microsystems introduces RTOS-Link™, the next step in a new level of embedded systems development tool interoperability.

RTOS-Link is a software support package that provides integration of pSOS+ kernel awareness with Applied's MWX-ICE source-level debug and emulation environments.

This integrated tool will help you pinpoint common, yet difficult to find software/hardware integration problems at the task level. A quick, one-time link to your application eliminates recurring setup hassles. No one provides a more complete environment for your real-time OS-based development, debug and integration needs.

Trace Run-Time/OS Interactions

- Understand how pSOS activity and interrupts affect the flow of your application
- Trace all pSOS service calls, including input and output parameters
- Trace all return codes
- Trace all error messages
- Capture and display all task switches
- Track execution time for each task timeslice
- pSOS trace information is translated into textual description with native pSOS mnemonics

Track Dynamic OS Activity

- Track all creation and deletion of dynamic pSOS objects
- Detect attempts to free invalid memory partitions and regions
- Track all dynamic allocation and deallocation of memory

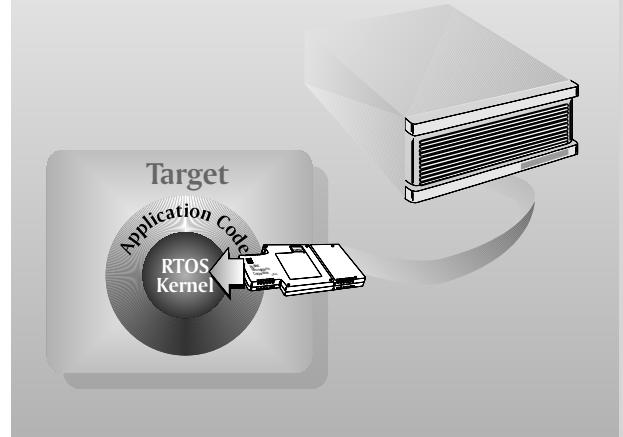
Monitor OS Objects

- Display node, component, and object configuration tables
- Display summary information for all tasks, queues, regions, partitions and semaphores
- Display detailed information for individual tasks, queues, regions, partitions and semaphores
- Displays full task contexts including size location and current status of stacks

Uncover Problems Based on OS Activity

- Detect task stack overflow conditions
- Set hardware and software task-qualified breakpoints using symbols
- Stop if any pSOS service call generates an error
- Trigger breakpoints based on a switch to a given task

RTOS-Link—bringing intelligence to real-time development.



Profile OS Operation

- Profile task by: pSOS clock ticks, time in task, and percentage of system time tasks are active
- Display data in histogram or statistical formats
- Clear accumulated profile data on command

Debugging an embedded system can be a complex task, and trying to understand the application interaction with the OS and target at run-time can add to the difficulty. Since you have invested in a real-time operating system for efficiency and productivity, it makes sense to move kernel awareness into your emulation environment as well. By including RTOS-Link with Applied's emulators, you quickly gain easy access to a variety of capabilities to help you view your system at run-time from the task level thereby improving your productivity and time to market.

Tracking Dynamic pSOS+ Activity

Following the dynamic usage of OS objects and memory allocation has always been a difficult problem. RTOS-Link allows you to track activities such as the creation and deletion of dynamic objects and memory allocation as it occurs in your system. This can be very useful for tracking the size and location of memory regions and partitions when the system allocates memory. You will also be able to



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For more information:

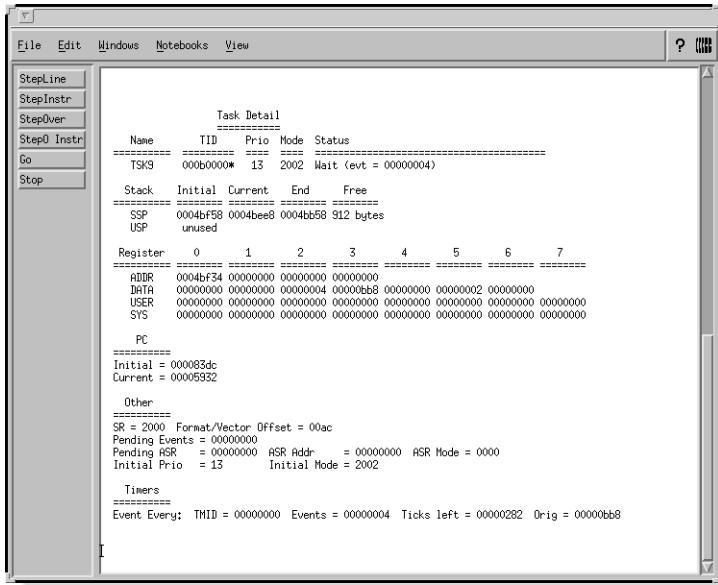
Call 1-800-426-3925; E-Mail info@amc.com;

Browse <http://www.amc.com>

detect attempts at freeing invalid memory segments.

Was it perhaps a corrupt pointer? Maybe the wrong object ID? By tracking the values of all input and output parameters to OS service calls, you can quickly pinpoint the cause of any dynamic pSOS+ activity problems as the kernel interacts with your target application.

performance.

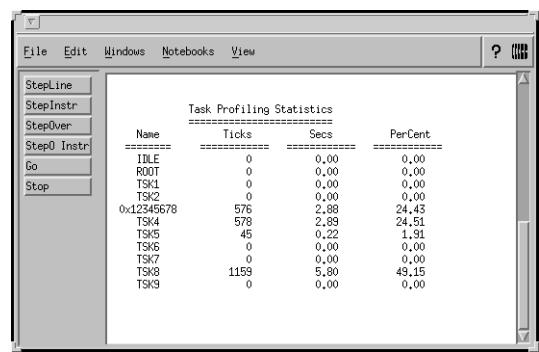


An itemized display of pSOS+ task information provides task context information, status, pending activities, timers, ASR and task stack detail.

Profiling pSOS+ Tasking Operations

RTOS-Link provides a convenient method for profiling the tasks in your system. You can display data in an easy to read histogram, or in a statistical format that includes accumulated pSOS+ clock ticks, time in tasks, and the percentage of total system time the tasks were active.

These measurements make finding software bottlenecks much easier. You want your system performing in synch. Task-based profiling allows you to visualize potentially over-utilized functions. Profiling can also aid in the detection of system thrashing, where task switching and control mechanisms are not being utilized for optimal system



An example statistical profile of pSOS+ tasking activity displays symbolic task names, accumulated pSOS+ timer ticks, execution time translation, and percentage system execution time spent per task.

interaction and task flow occurring in your system. When using a monitor/debugger, you can not determine how your system got to a particular state or where it went subsequently. The trace capability of RTOS-Link solves this problem.

When task switches occur, the trace window conveniently displays each task timeslice in individual text blocks. The real-time, timestamping mechanism determines the amount of time the application spent executing in a particular task. This can be useful for understanding and measuring the timing required for individual tasks and response to inter-task communication, such as posting semaphores and responding to events.

You can also easily switch between tracing at the source, disassembled, bus-level or mixed modes and OS activity.

Uncovering Problems Based on pSOS+ Activity

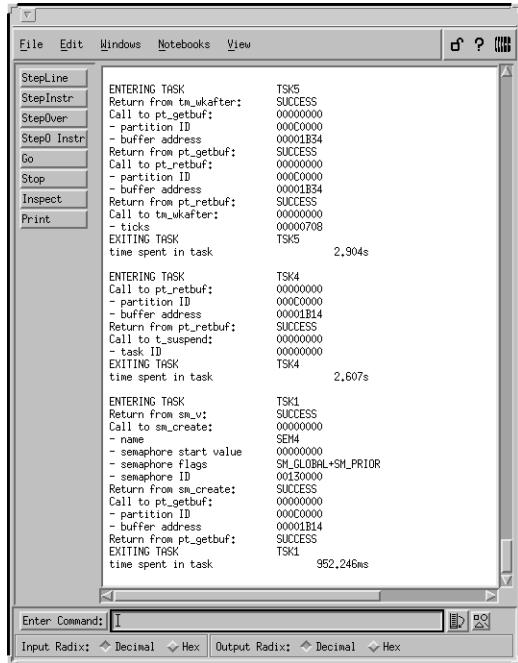
By linking Applied's real-time break and event system capabilities with pSOS+ interaction, you have a variety of tools to help you isolate problems that may creep up as you integrate your application with the OS and target.

Since you may have many tasks that all call a given service routine, RTOS-Link's task-qualified breakpoint capability will help you quickly weed out the culprit through a combination of RAM-based software execution

task-based problem can quickly be narrowed by stopping on the occurrence of a switch into a particular task.

Another useful capability is the means to stop emulation when pSOS+ returns an error code. This can be very useful during integration when you begin debugging time-critical interactions within the system. Furthermore, during the test phase of your project, you may be quite confident of the interaction between the OS and the target application, but you will certainly want to know if an unusual error in OS activity occurs during long burn-in test periods.

Perhaps one of the most difficult problems to track down is when one of your task stacks overflows. It's usually way too late to figure out what happened to cause your application to execute in unexpected territory. RTOS-Link provides the capability to monitor for a task stack overflow condition. When such a condition is about to occur, you are notified ahead of time, so you can examine the state of the task's stacks and take corrective action before it's too late.



Trace flow of pSOS+ activity provides descriptive information about your service calls.

Object Summary		
Name	ID	Type
RN#0	00000000	REGION
IDLE	00010000	TASK
ROOT	00020000	TASK
TSK1	00030000*	TASK
TSK2	00040000*	TASK
0x12345678	00050000*	TASK
TSK3	00060000*	TASK
TSK5	00070000*	TASK
TSK6	00080000*	TASK
TSK7	00090000*	TASK
TSK8	000a0000*	TASK
TSK9	000b0000*	TASK
MEM1	000c0000	PARTITION
SEM1	000d0000	SEMAPHORE
SEM2	000e0000	SEMAPHORE
SEM3	000f0000	SEMAPHORE
KV11	00100000*	QUEUE
KV12	00110000	QUEUE
RGN1	00120000	REGION

A summary display of all objects created in a system, including symbolic name, ID and object type.

Monitoring pSOS+ Objects

Traditionally, when you move to an emulation environment you lose sight of all kernel objects in your system. RTOS-Link provides the capability to monitor the status of all kernel objects with which your application interacts.

Often a summary of kernel objects is sufficient. With RTOS-Link, you have the option of seeing summary-level detail of all pSOS+ objects in the system, or summary-level detail of any group of particular objects, such as tasks, queues, semaphores, partitions or regions.

Sometimes more detail is required, so you also have the ability to request detailed information about any structure in your system. This is very useful for debugging at the task-level, where you need to know information about specific task contexts, task pending and ready status, and the size, location and current positioning of local stacks.

RTOS-Link from Applied Makes It Simple

To improve your productivity, you need tools that are not only powerful, but easy to install and use. RTOS-Link can quickly be added to your application just once, eliminating setup problems that compromise solutions impose. Because RTOS-Link is an integrated software package for the MWX-ICE environment, it installs easily into your existing software directory structure.

Perhaps you are familiar with the pROBE and ESp debugging tools from ISI. Because they are software-based, you can use them concurrently with Applied's emulation environment and RTOS-Link. In fact, you could have them running on the same workstation if you'd like. Since Applied's emulation environment can be accessed seamlessly across the network, you can have convenient access to your target environment from anywhere on your network.

RTOS-Link transparently supports both versions 1.2 and 2.0 of pSOS+. The RTOS-Link software will determine which version of pSOS+ your target is running, and will make the appropriate control adjustments.

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Helping You Succeed

Because our success depends on your success, we take product support very seriously. Applied has the qualified and committed people it takes to provide superior engineering assistance, technical guidance on emulation issues and expedited product service. Our Applications Engineering Group is backed by a network of experienced Field Applications Engineers, our own design teams, and the commitment of the entire company. And with over 16,000 installed solutions and more than fifteen years of leadership in embedded hardware and software development tools, our team is an important asset to have on your team.

Software Support

Applied Microsystems provides software upgrades through purchase of a software support contract. Contact your Applied Sales Representative for more information.

Take the Time to Call Now

To see how RTOS-Link for pSOS+ can help you increase productivity, call 1-800-426-3925 for information or a product demonstration.

Compatibility

RTOS-Link for the pSOS+ real-time operating system is a software option for Applied Microsystems emulation environments. An Applied Microsystems emulation environment is required to use RTOS-Link. Contact Applied for a list of currently supported microprocessors and microcontrollers. RTOS-Link supports both versions 1.2 and 2.0 of pSOS+.



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