



RTOS Debugger for Symbian OS (EKA2)

ARM XSCALE

- Real-time non-intrusive display of SymbianOS system resources
- Thread related breakpoints
- Thread stack coverage
- Thread context display
- Full integrated MMU support
- Debugging drivers, processes, libraries and applications
- Debugging several processes and applications at once
- Dynamic thread performance measurement
- Symbian OS specific display of real time trace
- Statistic evaluation and graphic display of thread run times
- Thread related evaluation of function run times
- Statistic evaluation and graphic display of thread states
- PRACTICE functions for OS data
- Symbian OS related pull-down menu

The TRACE32 System includes a configurable RTOS debugger to provide symbolic debugging in real time operating systems. Our software package contains a ready-to-run configuration for the Symbian OS (EKA2) Real Time Kernel from Symbian.

In close cooperation with Symbian, we built a highly sophisticated Symbian OS awareness, which enables you to do a most effective debugging with the TRACE32 systems on targets running Symbian OS.

RTOS Awareness on TRACE32 for Symbian OS

Real Time, Non-Intrusive Display of Symbian OS System Resources

The TRACE32 RTOS debugger for Symbian OS provides display functions to show the system resources of Symbian OS. All objects, such as processes, threads, libraries and chunks can be displayed and inspected. In addition, by using the processors capability of reading the target memory

while the application is running, or 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.

The screenshot displays two windows from the TRACE32 debugger. The top window, titled "B:TASK.PROCess 'HelloWorld.exe'", shows a detailed view of a process. It includes fields for magic, name, id, priority, attributes, threads, chunks, and entry. Below this, it lists attributes (Resumed, Moving, VarAccess), file name (Z:\System\Programs\HelloWorld.exe), and command line (Z). It also shows code segments with addresses, text sizes, data addresses, data sizes, and bss sizes. The threads section lists a single thread named "Main" with magic 64064C30. The bottom window, titled "B:TASK.PROCess", shows a list of processes with columns for magic, name, id, priority, attributes, threads, chunks, and entry. The list includes various system and application processes like EKernel.exe, EFile.exe, alarmserver.exe, Ebsrvr.exe, System, watcher.exe, FlogSvr.exe, LogServ.exe, MsvServer, and HelloWorld.exe.

Process list window and detailed window of one specific process

The screenshot displays two windows from the TRACE32 debugger. The top window, titled "B:TASK.THREAD 'WatcherThread'", shows a detailed view of a thread. It includes fields for magic, name, id, priority, state, type, and process. Below this, it shows mutex list, supervisor stack/size, user stack/size, nthread stack/size, and sp. It also lists exception handlers and their masks, and exit types with reasons and categories. The bottom window, titled "B:TASK.THREAD", shows a list of threads with columns for magic, name, id, priority, state, type, and process. The list includes various threads from different processes, such as ViewServerThread, AlarmServer, AppArcServerThread, DBMS_server, System, WatcherThread, WatcherMainThread, Flogger_server, SystemServerThread, LogServ, Main, ReclaimThread_170025, and Main.

Thread List and detailed window of one thread

Thread Related Breakpoints

Any breakpoint set in the TRACE32 debugger can be set dependent to a specific thread. This means, that the

breakpoint will then only halt, if hit by the specified thread. This allows thread related debugging even in shared code.

Thread Stack Coverage

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

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

name	low	high	sp	%	low	spare	max	0	10	20	30
c32exe.exe:PhikSyncServer	65939000	6593A000	65939FC0	1%	65939CEC	00000CEC	19%				
baksrvs.exe:BackupServer	65941000	65942000	65941FC0	1%	65941C4C	00000C4C	23%				
Start.exe:Main	65943000	65944000	65943FC0	1%	65943C4C	00000C4C	23%				
Sysagx.exe:SystemAgent	65945000	65946000	65945FC0	1%	65945CE4	00000CE4	19%				
LogServ.exe:LogServ	65947000	65948000	65947FC0	1%	65947D04	00000D04	18%				
MsvServer:Main	6595B000	6595C000	6595BFC0	1%	6595BC4C	00000C4C	23%				
.exe:Rec1aimThread_1708254	6595D000	6595E000	6595DF68	3%	6595DD04	00000D04	18%				
HelloWorld.exe:Main	6595D000	6595E000	6595DF88	2%	6595DD04	00000D04	18%				

Thread stack coverage window

Thread Context Display

The TRACE32 RTOS Debugger provides an easy way to switch the current displayed context to another thread. Normally all register related windows (e.g. listing at current PC, local variables or function call stack)

are displayed related to the actual context (i.e. current executed thread). You can switch to the context of another thread to see all this information at the time this thread was scheduled.

Debugging Drivers, Processes, Libraries and Applications

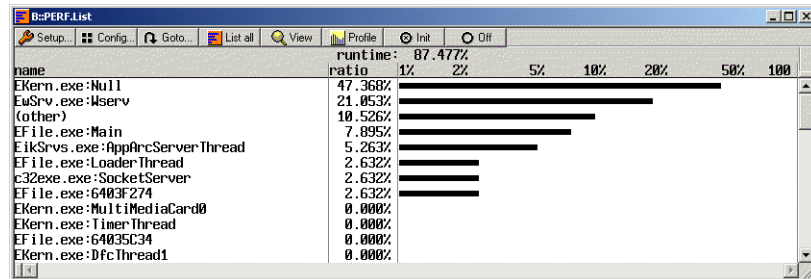
Due to the fact, that TRACE32 is a hardware debugging tool, you are able to debug anything you want, including bootstrap code, initialization phase, interrupt routines, drivers, kernel, etc. TRACE32 includes a complete MMU support, providing mechanisms to inspect the target memory using virtual addresses or physical addresses and to show the translation tables.

Additionally, TRACE32 has a special MMU support for several address spaces, which allows you to debug several Symbian OS processes and applications at once. An internal logic provides you with an easy access to all process memory spaces. A special process detection mechanism allows to halt the application exactly on the entry point of a process, allowing you to debug your process right from the beginning.

Dynamic Thread Performance Measurement

While Symbian OS is running, TRACE32 is capable of recurrently evaluating the current running thread and collecting the results. The percentage, each thread consumes of the system, is then displayed 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.



Performance measurement list

Symbian OS Specific Display of Trace Listing

The data recorded in the trace buffer can be displayed and interpreted specific to the operating system.

The thread switches are displayed symbolically, either exclusively or in addition to other information.

Statistic Evaluation and Graphic Display of Thread Run Times

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

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

Thread 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 thread. This is necessary, if dif-

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

Statistic Evaluation and Graphic Display of Thread States

These tabular and graphical analyses of the status of threads show the various states (i.e. running, ready, waiting, suspended and undefined) and times

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

PRACTICE functions for OS data.

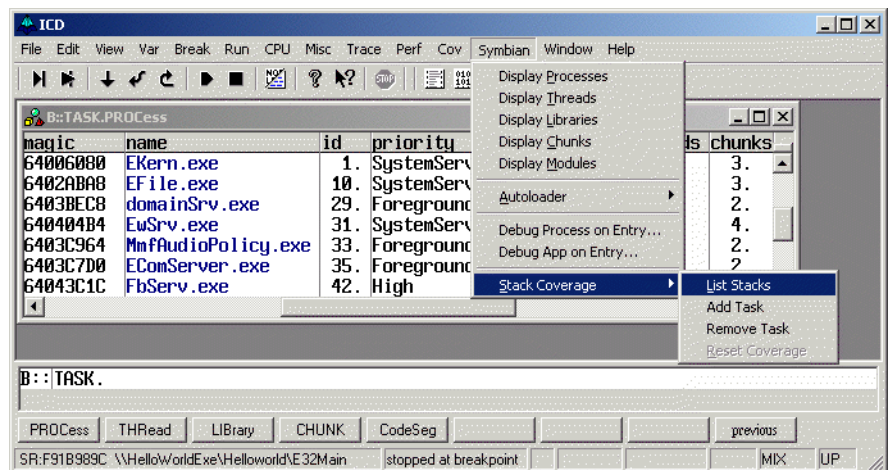
The support includes extended PRACTICE functions for Symbian OS specific data. E.g. the function "TASK.CONFIG

(magic)" returns the address of the so called magic value, which corresponds to the id of the current executed thread.

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



TRACE32 with Symbian OS menu

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