Eclipse-based plug-in analyzer profiles software running on MIPS32® cores.

Host Requirements

Pentium class PC with minimum 1024 MBytes of memory, USB or Ethernet port, and Windows® 2000/XP or Linux operating system are required. Profiling larger programs requires additional host memory.

Product Codes

NAV-HSA: Hot Spot Analyzer plug in license for Navigator IDE

Hot Spot Analyzer for MIPS32® Cores

The Hot Spot Analyzer, or HSA, is an Eclipse plug-in that provides non-intrusive profiling of software running on MIPS32 cores. It is built on the unique Zero Overhead Program Counter (PC) Sampling feature that is included in the MIPS 24K®, 34K™ and 74K™ cores. The tool combines that feature with the company's System Navigator™ EJTAG probe, and host software to collect and display measurement results in the MIPS Navigator IDE™, an Eclipse-based development and analysis tool suite. HSA is licensed as an Eclipse plug-in option.

Linux Kernel Profiling

HSA was designed specifically to support Linux kernel profiling, which resides in the kseg0 region of the MIPS memory architecture. It can handle large numbers of module and function symbols - the typical Linux kernel has over 12,000 – and accumulate counts for each address range they represent. The HSA accumulates the total counts then sorts and displays percentage of total counts for each symbol providing a profile view of the target's kernel activity.

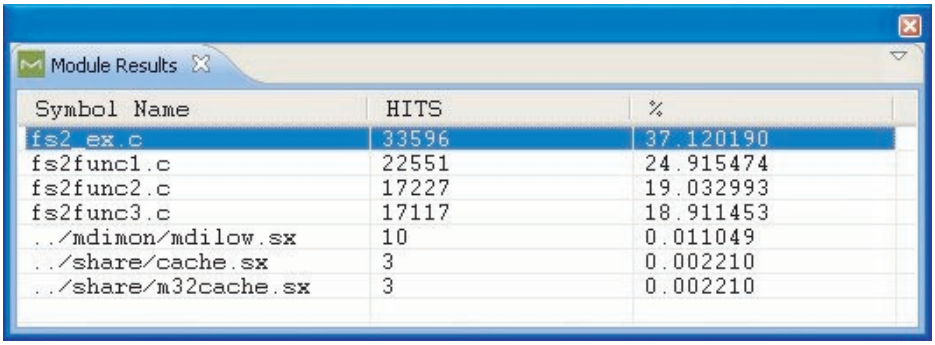
With this information the user can quickly identify program bottlenecks that are restricting system performance and understand the best methods for making kernel system calls.

Linux Loadable Modules Profiling

Most device drivers are built as Linux loadable modules. These are run-time loaded into the kseg2 memory space of the MIPS architecture. The Hot Spot Analyzer can load multiple .elf symbol files – one for each loadable module - and provide the means of entering the offset address of where the module was loaded. This adjusts each symbol to its absolute virtual address.

High Speed PC Sampling

All MIPS 24K, 34K, and 74K family cores include an EJTAG port with the ability to read the latest retired program counter value. With the FS2 System Navigator EJTAG probe able to run the clock at up to 66MHz, PC sampling operates at high speed, some 50 to 500 times the rate of interrupt-based PC sampling resident software. High speed sampling delivers results faster, more accurate, and can profile transient code.



Multiple Symbolic Result Views

HSA provides multiple views of the profiling results with different levels of address granularity, based on symbolic information loaded from the .elf file, built with debug information included.

Modules – these are the same as .c, .cpp, or .s files; the module address range is the inclusion of the code of all the functions in that file. When sorted, the modules at the top indicate the functional areas of measured program that are consuming the most CPU cycles

Functions – this level of the granularity shows the accumulated hits of code execution for each function. Functions at the top of the list should be optimized as much as possible. Functions at the bottom could be compiled into MIPS16 instructions which take up less space to optimize memory footprint.

Line numbers – double clicking on a module or function will bring up the source file view and show the hits for each source line. This will show "hot" paths in code made up of many conditional paths (e.g. if-then-else or switch-case statements) or loops (for, while, do).

Instructions – the source view can be expanded to show accumulated hits for each instruction generated by the compiler. This illustrates which instructions take up more time than others and can indicate where execution delays are caused by memory accesses including cache misses or other cpu execution stalls.

Easy to Set Up and Run

The HSA is an Eclipse plug-in that provides its own views and run controls. Because no instrumentation is necessary, it is simple to take measurements on a target MIPS core – plug in the SysNav EJTAG probe, load symbols, launch a debug session, then start the HSA plug-in. The results can be periodically updated or manually with a refresh button to review the latest results.

Hot Spot Analyzer Feature/Benefits

- Utilizes Zero Overhead Program Counter (PC) Sampling in MIPS32 cores.
- PC samples are taken at high speed with the System Navigator EJTAG probe.
- Provides results faster and with far more detail than interrupt-based software methods.
- HSA program is an Eclipse plug-in for the MIPS Navigator IDE product.
- Tailored for fast Linux Kernel profiling.
- Supports Linux Loadable Modules (device drivers) that run in kseg2.
- Easy to use – simply connect to target, load elf symbol file, start target and HSA, then view the results.
- Sorts results by hits in each symbolic range.
- Displays results at several levels of symbolic granularity - modules, functions, line numbers, or individual instructions.
- Saves measurement results into comma separated values file (.csv); can then be loaded into spreadsheet or processed with another program.
- Will measure "bare iron" systems which can include commercial off-the-shelf RTOSes or in-house varieties.

Hot Spot Analyzer uses zero-overhead, high speed PC sampling

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