Embedded Benchmark Work Under Way

EEMBC Consortium to Have First Benchmarks Ready by End of 1998

by Jim Turley

After years of talking, experimenting, and planning, the Herculean task of developing benchmarks for embedded microprocessors is finally nearing completion. Although they may not mean the death of Dhrystone right away, the new benchmarks promise to provide far more useful metrics to designers trying to make sense of competing performance claims.

Springing from work begun more than two years ago at the Microprocessor Forum and elsewhere, the EDN Embedded Microprocessor Benchmark Consortium (EEMBC, pronounced "embassy") expects its first suite of tests to hit the streets by 4Q98. Beginning in 1999, vendors and customers should be able to use the tests as an objective measure of processor performance.

Organization Is Similar to SPEC

The group creating these benchmarks is made up of representatives from 21 microprocessor designers and manufacturers, from ARM and AMD to TI and Toshiba. Their goal is to create a set of useful tests that is portable across processor architectures, hardware platforms, and operating systems but that measure some specific aspect of a processor's performance, independent of other characteristics. Unlike Dhrystone, which distills a single score, the EEMBC benchmarks will be a diverse collection of tests, each one with a specific application focus.

Somewhat like SPEC, chip vendors will be expected to perform their own benchmarking and report the results—including detailed descriptions of the hardware and software environments—to EEMBC for approval. Only after EEMBC verifies their veracity will the results be considered official and posted in the regular EEMBC bulletin. Also like SPEC, vendors must report a basic "out of the box" score with no software optimizations. A "peak" score is also allowed; it may include hand optimizations, proprietary library routines, and nearly any other tweaks as long as they are disclosed, are repeatable, and do not violate the intent of the benchmark (such as hard-coding results).

On the other hand, EEMBC will not prevent vendors (or any other interested parties) from running the benchmarks at any time, under any conditions, and advertising their results. Such results, however, will not bear the imprint of EEMBC's oversight. Thus, the intention is first to make the EEMBC benchmarks ubiquitous, and second, to make them reliable and verifiable.

Five Categories Define Application Use

To help manage the task, EEMBC has initially divided the universe of embedded code into five application areas: automotive/industrial, consumer, networking, telecommunications, and office automation. Within each area, a number of key algorithms or tasks are defined, such as IDCT, table lookup and interpolation, or color-space conversion. Finally, a portable benchmark for that algorithm is developed by outside contractors working in ANSI C.

The hurdles to developing portable benchmarks are formidable. The same source code must be usable on any processor, from 8-bitters on up to 64-bit chips, with either big- or little-endian byte ordering. This will make tests of pointer dereferencing and extended-precision arithmetic, for example, difficult to develop.

The group is still debating the usefulness of allowing individual benchmark scores to be combined into a single "EEMBCmark" or similar figure of merit. A single score is easier to compare (and market) but would obscure details of individual performance. A weighted average could provide a useful yardstick, but the weighting scheme would have to be carefully considered.

At Last, an Alternative to Dhrystone

Although it's too early to judge any results, EEMBC seems to be on the right track. At the very least, the group has garnered the attention—and material support—of most of the top microprocessor makers. (As usual, Intel is ignoring standards it doesn't control.) A selection of narrowly focused, individual tests will allow prospective customers to pick and choose those results that are most relevant to their intended application. EEMBC's grouping of the tests into five categories is useful without forcing OEMs to extrapolate their requirements from a single broad industry category.

The proof will come in about a year's time, when chip makers can start using EEMBC ratings in addition to—or instead of—simple Dhrystone MIPS ratings. When embedded designers can reasonably begin to sift through the hundreds of microprocessors available using trusted, third-party benchmarks, EEMBC will have reached its goal. ◆

For More Information

The EEMBC is a nonprofit organization open to manufacturers of microprocessors, microcontrollers, and DSPs. Alpha releases of the first benchmarks should be available to members in September. As benchmark results become available, they will be posted to EEMBC's Web site, which can be found at *www.eembc.org.* For more information, send e-mail to Markus Levy at *info@eembc.org.*