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Editorial and Business Offices,
1719 N St., N.W., Washington, D.C. 20036.

Subscription Department
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This Week

Research Notes

Articles

Cover: Determining whether a tangled loop is really knotted and distinguishing different knots are two central problems in knot theory. In the last few years, mathematicians have developed several new methods for telling knots apart. These techniques already have proved useful in molecular biology and may yet find a place in theoretical physics. (Image: Dobkin/Princeton)

Departments

Letters

Brand X

You neglected to mention in "Jump for joy: Blue frog babies" (SN: 4/16/88, p.247) the most important factor in breeding the blue poison arrow frogs using plastic soda bottles: Did things go better with Coke, or did they come alive in the Pepsi generation?

Al Geiersbach
Milwaukee, Wis.

The herpetologists at the National Aquarium in Baltimore say they use any and all brands. In fact, the frogs' huts don't have to come from soda bottles at all. European herpetologists have made cozy nests from halves of coconut shells. In the wild, the frogs lay their eggs under leaves and logs. — S. Weisburd

Competing computers

Regarding "Record Speedups for Parallel Processing" (SN: 3/19/88, p.180) some words of context would help put the Sandia achievement in perspective. The Karp challenge and the Gordon Bell Award are restricted to "general-purpose computers" and "computers with many program counters" respectively, both synonymous in that community with multiple-instruction, multiple-datastream (MIMD) architectures. Single-instruction multiple-datastream (SIMD) is a major competing architecture for parallel processing.

SIMD parallel computers are characterized by multiple (generally many) processors that all perform the same instructions in lockstep. For example, in image processing each picture element is loaded into its own processor; to subtract a constant from each picture element's value, one subtraction command is broadcast to all of the processors and all of those subtraction operations are performed simultaneously. This is also termed data-level parallelism, since the data items are distributed among the processors.

MIMD computers, on the other hand, distribute different parts of a program among the processors. Each processor has its own set of instructions. Hence, while one processor is doing subtraction another can be doing a multiply or square root. The challenge of MIMD programming is to balance the load so no processor completes its instructions and becomes idle while another processor is still busy.

The Sandia achievement is remarkable because MIMD architectures, which are said to employ control-level parallelism, and which can employ algorithms originally developed for sequential computers, are notoriously hard to program effectively. SIMD machines are easy to program but usually require algorithmic redesign to make effective use of the thousands of processors.

R. Michael Hord
Technical Director
Advanced Development Center
MRJ, Inc.
Oakton, Va.