Unsafe At Any Speed?

Looking under the hood at Sun's recent server engine problems


January- 2002 article by Peter Baston

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Editor's intro:- in 1985 Ralph Nader wrote a book called "Unsafe At Any Speed" to expose design flaws with the Chevrolet Corvair manufactured by GM.

In 2001 Sun's cache memory problems caused millions of dollars of wasted time in corporate America and shattered the myth of Sun server reliability. Sun's reported communications about this subject have tried to pass the buck to a major supplier, IBM. But Sun could have designed around this problem, or detected it earlier.

Why another article on Sun's cache memory problems? Well, even if you've already read many of those, this new article by Peter Baston includes useful comparisons on the approach of different SPARC systems vendors and data on "failures in time" for different models of SPARC systems, which you may find very interesting.

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The recent comments by Sun Microsystems' Chairman and CEO, Scott McNealy, are extremely interesting and shows the absolute importance of truth and candor by senior executives of any company. Often the first signs of deeper problems within the company come from very simple statements by executives that later appear to be misleading and incorrect. Once corporate credibility has been lost it takes years to recover, and sometimes never does.

Lets take a very candid look at the comment (reported in a Computerworld article November 27, 2001)

Q: We reported last year about the problem with the external memory cache on UltraSPARC IIs that was causing a lot of Ultra Enterprise servers to crash. Is that something you're still grappling with, or is it history?
A: We're no longer buying IBM SRAM [static random-access memory]. They were the biggest source of the problem for us. They knew about it before, and they didn't tell us. But we don't have that issue anymore. We designed IBM out of that and put [error checking and correcting logic] across the entire cache architecture.

The Shell Game

As we all know the real purpose of a shell game is to distract the viewer from where the REAL situation is.

What really WAS the defect: ---Where should we look for the REAL problem.

The industry has been rife with rumor and innuendo for three years, not helped by the fact the parts of SUN still today denies there is a problem. No statement has ever been issued by Sun's corporate office to clarify and no clear corporate policy has ever been introduce to rectify the problem.. ScottM seems be pointing at normal day to day QA problems and outside suppliers. Sun takes a risk by subcontracting the majority of its work to third parties, and in doing so bears the responsibility ensuring compliance. This comment seems to say this is really no big deal and not worth talking about. Classic Shell Game. Watch this hand not THAT one.

The truth is far more serious.

In my view, the real major defect was the complete lack of design of Error Correction in level 1 and 2 of the CPU cache of the UltraSPARC II Sun's flagship CPU processor.

Error Detection and Correction Primer

Transient errors (as opposed to permanent errors due to device failures) can occur in all digital systems. They can be caused by electrical noise, ambient radiation, clock jitter and other causes. As far back as 1948, R.W. Hamming of Bell Labs developed a general theory for error-correcting schemes in which "check-bits" are interspersed with information bits to form binary words in patterns. These are now referred to as Hamming codes.

The rate of failure, and consequences, if unchecked, are important parameters in system design. Communication systems always use error correction, because the total environment is not under the control of the designer. Memory and storage systems are particularly vulnerable, because they can capture and store a transient error bit which might have no effect in another part of the...
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