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From the lab

By Mark Leon
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CODE DEBUGGING is a headache most CTOs are familiar with -- the kind of headache that costs time and money. But an efficient error-checking system for businesses may be in the offing.

Gerard Holzman has been tackling the issue since he joined Bell Labs in Murray Hill, N.J., about 20 years ago.

"Code debugging has always been a big problem," says Holzman, computing sciences researcher at Bell Labs, the R&D arm of Lucent Technologies.
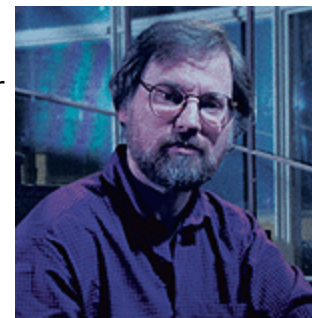

GERARD HOLZMAN,
Bell Labs

But it is now much bigger, he explains, for two reasons: Programs are longer than they were in 1980, but the density of errors (number of errors per lines of code) remains the same. It means the quantity of errors have skyrocketed. In addition, isolated applications are now the rare exception. Multiple dependencies among distributed applications make code debugging far more complex than ever before.

In the '80s, Holzman started applying Linear Temporal Logic theory to the problem of debugging code. "We were able to construct models that are very efficient at revealing errors," Holzman says.

The problem was that the models themselves were difficult to construct. In the last few years Holzman and others realized they could use Omega Automata theory, a branch of mathematical logic thought to have little or no practical value, to automatically generate the models needed for error-checking.

"With this technique it now takes me four seconds to debug code that took seven days to debug back in 1980," Holzman says.

Bell Labs is now using the new techniques to help NASA test software that will guide the next Mars landing missions. But Holzman thinks they will soon show up much closer to home.

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"I expect that within five years," he says, "this type of error-checking will be standard in most software development tools."

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