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CATS Tool Improves System Test Case Selection

System testers know it's easy to specify lots of test cases. The hard part is finding just enough of the right tests to do the job. Running too few tests puts quality at risk, while too many tests waste resources.

The Constrained Array Test System (CATS) helps testers pick just enough test cases. The tool, which is based on UNIX[1] software, operates two ways. It can analyze cases from an existing plan and suggest cases to add or remove, or it can generate a set of new test cases from test factor information.

George Sherwood, a developer for EasyLink Services, created CATS. He saw the need for the tool while supervising a StarGROUP® software test group. "Our requirements called for thousands of supported configurations, far too many to test," says Sherwood. "We tried using a tool based on orthogonal arrays, but it sometimes suggested impossible test cases, such as using a PC with an 8088 processor and a Micro Channel[2] bus, or an 80386 processor with DOS 3.1. Vendors just don't support these configurations."

To accommodate these constraints, Sherwood developed CATS based on a computing technique used in data analysis and in expert systems. It repeatedly selects the next "best" test case to run. The "best" case is the one that, if run, would give the fewest number of untested combinations of test factor values. CATS follows the steepest path through the test cases, to get to the minimum number of untested combinations. "The technique is ideal for analyzing test cases," Sherwood says. "CATS handles arbitrary constraints and dependencies easily. We also found some unexpected benefits. Compared with using orthogonal arrays, CATS can process larger test problems, and typically recommends fewer test cases to run." ■

For ordering information, call USTOP at (201) 564-3330. For additional technical information, contact Sherwood at **attmail!gsherwood**, or (908) 576-7273.

1 Registered trademark of UNIX System Laboratories, Inc.

2 Registered trademark of International Business Machines Corp.

THIS IS A TEST — Sample CATS output for a test problem with 63 factors, each of which has two values. There are over $9 \cdot 10^{18}$ possible test cases and 7812 factor value combinations. CATS suggests 15 test cases (listed in the rows numbered 1 to 15) to cover all the combinations. The column on the right that starts "7812" shows a count of untested combinations after each test case is run. The L64 orthogonal array recommends 64 test cases in this example.