
Robust Software Engineering

PRACTICAL WEB APPLICATION VERIFICATION

HIGHLIGHT: Fujitsu Laboratories Ltd. and Fujitsu Laboratories of America, Inc. have developed the world's first core technology for automatic verification of Java-based practical-use web applications. The verification system can automatically verify if a web application can operate properly to process specified task transactions without the need for manually preparing detailed test procedures or test data. It is based on Java PathFinder (JPF), the open source verification tool developed by NASA Ames Research Center.

The JPF team of the Robust Software Engineering (RSE) group recently conducted a comprehensive field test with Fujitsu Laboratories of America and Fujitsu Japan to validate and mature the JPF tool suite in the context of large industrial applications. Fujitsu Laboratories plans to conduct testing for an actual project, and will continue with research targeting practical use of this technology.

BACKGROUND: Java PathFinder (JPF) is a system to verify executable Java bytecode programs. In its basic form, it is a Java Virtual Machine (JVM) that is used as an explicit state software model checker, systematically exploring all potential execution paths of a program to find violations of properties like deadlocks or unhandled exceptions. Unlike traditional debuggers, JPF reports the entire execution path that leads to a defect. JPF is especially well-suited to finding hard-to-test concurrency defects in multithreaded programs.

JPF is a pure Java application that can be run either as a standalone command-line tool, or embedded into systems like development environments. Started in 1999 as a feasibility study for software model checking, JPF has found its way into academia and industry, and has even helped detect defects in real spacecraft. It is available under the NASA Open Source Agreement from the software development Web site SourceForge.net.

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