saveCHIMP: Application-aware Testbench for Chip Multi-Processors
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Motivation
Existing test generation solutions rely on random or directed tests that blindly explore the design space, which are inefficient.
If testing is not limited to a relevant pool of scenarios, resources spent on verifying complex systems in the future will grow without bound.

saveCHIMP (save CHIp Multi-Processor)
Test generation platform that generates tests based on the behavior of applications that are to run on the multiprocessor system

Goals:
• Characterize the execution space of the target application.
• Generate tests that exercise the same execution space as the target application.
• Speedup the validation process by generating tests with significantly less overhead than original program.

Characterization and Filtering
A sample trace 00: CPU1 ldr $r0 ... 163 7 736

Experimental Setup

Bug Injection Model

Experimental Results – Coverage
• Randomly generated testvectors act as the baseline to assess how well tests generated from saveCHIMP reflect the behavior of target program.
• Impact of applying each step of the saveCHIMP solution is shown.
• Final solution achieves 93% accuracy, due to its high true negative rate.
• Sensitivity and Precision are two areas that need to be improved upon.

Impact of Applying Each Step of the saveCHIMP Solution

Experimental Results – Overhead
• Tests generated from saveCHIMP are able to detect bugs more quickly with a smaller instruction footprint.
• Transaction characterization and filtering steps of saveCHIMP significantly reduce the bug detection latency.
• Transaction filtering help reduce the size of the testvectors by more than 70%.

Conclusion/Future Work
• Improve on sensitivity and precision of test generation process, while maintaining accuracy.
• Incorporate network traffic behavior into state characterization
• Expand saveCHIMP to analyze and compare behaviors of multiple applications.
• Apply saveCHIMP to heterogeneous systems.