Automatic Generation of Functional Stress programs with Enhanced Obvservability

Enrico Rovere
Politecnico di Torino
Corso Duca degli Abruzzi 24, Torino, Italy
enrico.rovere@studenti.polito.it

Keywords. System Level Test, Delay Faults, Evolutionary Generation.

Abstract

The present poster discusses a framework for improving System Level testability of an Automotive SoC exploiting the Evolutionary Optimizer microGP to maximize core switching activity. The present framework is meant for DUTs operating at voltages under specification, in order to exacerbate latent delay faults. The optimizer, provided with a set of instructions and operands, evolves generations of candidate Assembly programs. Each program is simulated and ranked to progressively increase the switching activity.

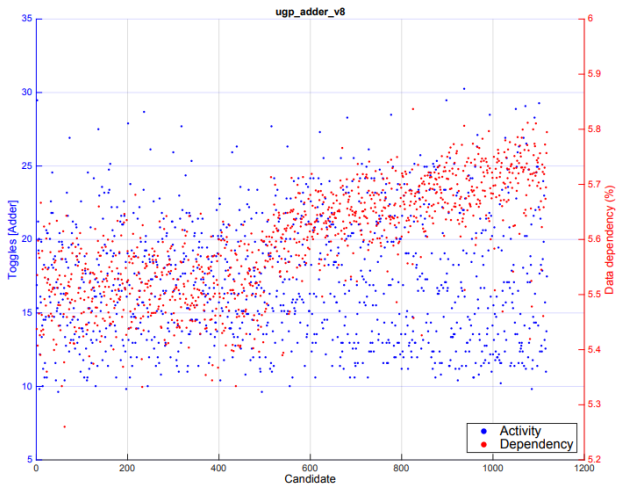

Figure 1. Evolutionary Optimizer microGP: Toggle Activity versus Dependency.

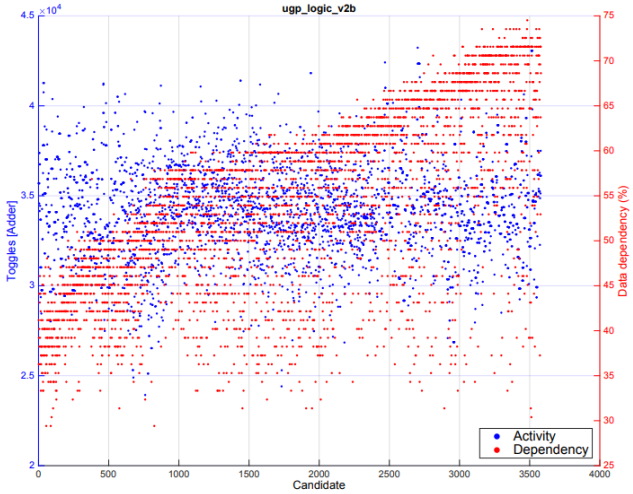

Figure 2. Evolutionary Optimizer microGP: Dependency versus Toggle Activity.

Moreover, the ranking algorithm exploits a graph-based representation of instructions to penalize individuals with a high percentage of Write-After-Write hazards, which prevent the detection of errors occurred during the execution of the test program. We define Dependency as the measure of the propagation ability of a stress program. At the end of the program, a signature is produced from the registers and compared to the expected value, producing a GO/NOGO signal. Figure 1 and 2 are showing the evolution of the automatic generation, guide

by Toggle Activity followed by Dependency, and vice versa. Figure 3 illustrates the Dependency computation algorithm based on a graph representation of the functional program.

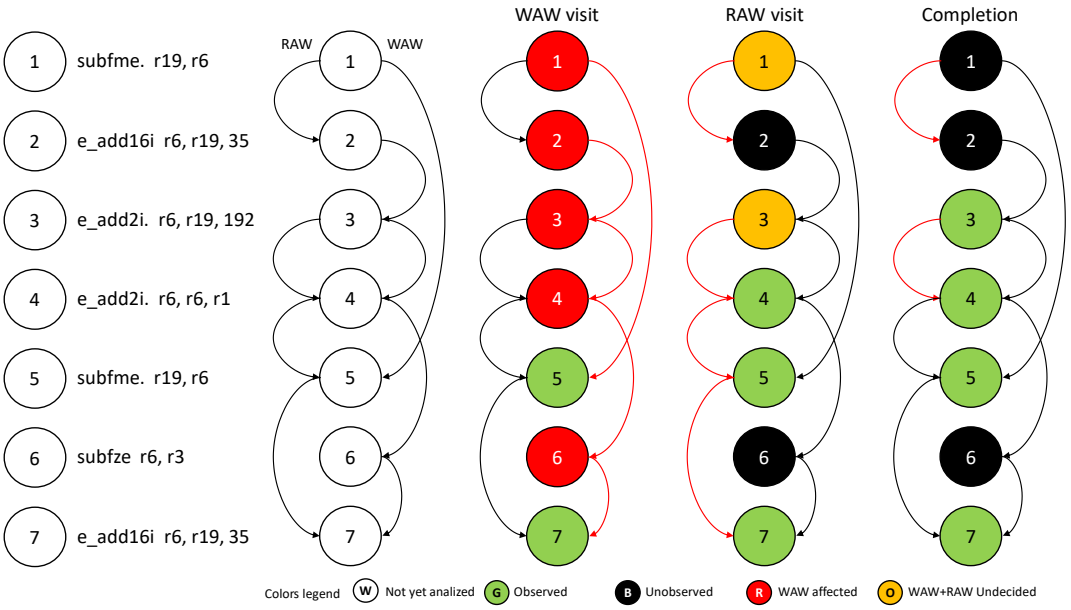

Figure 3. Dependency grade computation algorithm

References

[1] D. Appello et al., "A comprehensive methodology for stress procedures evaluation and comparison for Burn-In of automotive SoC," Design, Automation & Test in Europe Conference & Exhibition (DATE), 2017, Lausanne, 2017, pp. 646-649

Acknowledgment

I would like to express my gratitude to Prof. Bernardi Paolo, Dr. Restifo Marco and Prof. Sonza Reorda Matteo for their support to this research.