

Legato: An At-Most-Once Analysis with Applications to Dynamic Configuration Updates (Artifact)*

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Abstract

This artifact supports Legato, an at-most-once analysis. An at-most-once analysis ensures that an application never observes inconsistent versions of its environment by checking that every value depends on at most one access of every external resource used by the application. We have applied this general analysis to the problem of finding errors in applications that support dynamic configuration updates (DCU), i.e., configuration updates that are applied

immediately without program restart. When configurations may change at any point during execution, the enforcing the at-most-once condition for each configuration option guarantees that the program never observes inconsistent versions of configuration options. This artifact recreates our experiments, which applied Legato to 10 applications that support DCU and found several bugs across 9 of the 10 programs.

2012 ACM Subject Classification Software and its engineering → Automated static analysis

Keywords and phrases Static Analysis, Dynamic Configuration Updates

Digital Object Identifier 10.4230/DARTS.4.3.2

Related Article John Toman and Dan Grossman, “Legato: An At-Most-Once Analysis with Applications to Dynamic Configuration Updates”, in Proceedings of the 32nd European Conference on Object-Oriented Programming (ECOOP 2018), LIPIcs, Vol. 109, pp. 24:1–24:31, 2018.

<https://dx.doi.org/10.4230/LIPIcs.ECOOP.2018.24>

Related Conference 32nd European Conference on Object-Oriented Programming (ECOOP 2018), July 19–21, 2018, Amsterdam, Netherlands

1 Scope

This artifact is intended to be used to reproduce the experiments in the companion paper. In particular, this artifact includes the infrastructure to support the following claims in the paper:

- Legato finds dynamic resource consistency errors in our benchmark suite with a manageable ratio of true to false positives.
- Legato has reasonable time and memory requirements.

In particular, this artifact can reproduce Tables 1 and 2, and Figures 12 – 15. In addition, the artifact can reproduce statistics reported in the paper, such as peak memory usage. Claim 1 is supported by Table 2 and Figures 12 – 14, and Claim 2 is supported by Figure 15 and the statistics computed by the artifact.

* This work was partially supported under DARPA agreement number FA8750-16-2-0032.



2:2 Legato (Artifact)

2 Content

The artifact package includes:

- A README PDF describing how to setup to the artifact and recreate the experiments in the paper.
- A user guide (found in `doc/`) describing how to run Legato on other programs besides those in the paper.
- A virtual machine image (found in `vm/`) that contains all of the infrastructure required to recreate the experiments in the paper.

3 Getting the artifact

The artifact endorsed by the Artifact Evaluation Committee is available free of charge on the Dagstuhl Research Online Publication Server (DROPS). The source of Legato is also available at <https://github.com/uwplse/legato>.

4 Tested platforms

The core of the artifact is contained in a virtual machine, which is provided in the Open Virtualization Archive format. This format should work with any modern virtualization software, and has been tested with VirtualBox 5.1.34 running on Ubuntu 16.04. The virtual machine requires at least 10GB of physical RAM, 7GB of hard drive space, and a processor with 2 physical cores for the virtual machine.

5 License

The artifact is available under the MIT License.

6 MD5 sum of the artifact

618a2a99707f1b283b2dd01abe0b68d8

7 Size of the artifact

2.67 GiB