

# Artifact for the ICST 2018 Paper “Automating Targeted Property-Based Testing”

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The artifact is available online at the following URL: <https://goo.gl/RTSFCT>

It consists of a virtual machine image containing the sources of the artifact and also the preliminary version of a paper that will appear in ICST’2018.

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The purpose of our artifact is to make all source code, benchmark programs, and case studies contained in our paper “*Automating Targeted Property-Based Testing*” [1], publicly available. This hopefully allows other researchers to reproduce and verify the claims made in the paper and also to possibly build upon and/or extend our work.

The infrastructure for targeted property-based testing, including the neighboring function construction algorithm described in the ICST’2018 paper, is nowadays fully integrated into the open-source QuickCheck-inspired property-based testing tool PROPER<sup>1</sup>.

Some of the case studies used in the paper (e.g., the duty-cycle case study) have dependencies. We therefore installed all dependencies inside a virtual machine (VM) and placed the files that make up the artifact inside the VM’s file system. The VM image was created with VirtualBox<sup>2</sup> which is required to run it. The VM can be imported into VirtualBox by using the *| File | Import Appliance ...* dialogue.

## RUNNING THE EXPERIMENTS

A login screen will show up after starting the VM. It is possible to login with the username **user** and the password **user**. A shortcut to the terminal can be found on the desktop once logged in. The files for the experiments and their dependencies are located in the folder `~/ICST_artifact`. The folder contains the following elements:

**driver.erl** This is the top-level escript (Erlang script) that starts the experiments.

**properties/** This folder contains the properties for the case studies as described in our ICST’18 submission. It also contains any additional input data/files the properties need.

**proper/** This folder contains the property-based testing tool PROPER on which TARGET is currently an add on. The TARGET source files are in this directory.

**nifty-contiki/; contiki/; llvm/** These contain the dependencies to some of the experiments.

To run an experiment the **driver.erl** escript has to be invoked with the name of the experiment as the first argument. It is also possible to specify additional options like the amount of runs or the amount of tests per run. If run without any additional arguments, the experiments are run with the options as described in the submitted paper with the exception that the amount of repetitions is reduced to 100. The complete list of options can be seen if **driver.erl** is run without any arguments. It is possible to run the following tests:

**graph** This test checks the property `prop_length` (as described in Sections II, III and IV).

**duty-cycle** This test checks the energy efficiency of XMAC (as described in Section V-A).

**directional-antennas** This test checks the energy metrics of the routing trees for directional antennas (Section V-B).

**noninterference** This tests the noninterference property of a secure information-flow control machine (Section V-C).

Please note that all experiments involve some amount of randomness.

## EXAMPLES

```
$ ./driver.erl graph
$ ./driver.erl duty-cycle -normal
$ ./driver.erl directional-antennas -runs 42
$ ./driver.erl noninterference -byexec -numtests 10000 -runs 10
```

## HAVE FUN WITH THE ARTIFACT!

## REFERENCES

- [1] Andreas Löscher and Konstantinos Sagonas. Automating targeted property-based testing. In *Proceedings of the 11th IEEE Conference on Software Testing, Validation and Verification*, ICST 2018. IEEE, April 2018. Also available at <http://proper.softlab.ntua.gr/papers/icst2018.pdf>.

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<sup>1</sup><http://proper.softlab.ntua.gr/>

<sup>2</sup><https://www.virtualbox.org/>