

Demo: TSTL: a Language and Tool for Testing

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ABSTRACT

Writing a test harness is a difficult and repetitive programming task, and the lack of tool support for customized automated testing is an obstacle to the adoption of more sophisticated testing in industry. This paper presents TSTL, a language (and tool) allowing users to specify the general form of valid tests for a system in a simple (but expressive) language. TSTL is a minimal template-based language, using the language of the Software Under Test (SUT) to support most operations, but adding declarative idioms for testing. TSTL compiles to a common testing interface that hides that details of the SUT, making it easy to write universal testing tools (such as random testers or model checkers) that apply to all TSTL-defined testing problems. TSTL is currently available for Python, but easily adapted to other languages as well.

(choosing between a set of available API calls to make, and assigning values to parameters in those calls, for example) and is almost always tightly coupled to one particular test generation method. TSTL [2] is a language (and tool) intended to make these difficulties less onerous.

First, TSTL allows a harness to be defined in a declarative style, and provides support for many common testing idioms. Second, the declarative approach allows TSTL to output a generalized interface for testing: a class that allows a testing tool to determine available test actions, check for success or failure of tests as they progress, and even automatically produce logging, collect and analyze code coverage, and delta-debug failed tests.

Categories and Subject Descriptors

D.2.5 [Software Engineering]: Testing and Debugging

General Terms

Reliability

Keywords

Domain specific languages, testing tools

1. INTRODUCTION

Automated testing often requires a user to write a *test harness* — essentially a program that defines and generates the set of valid tests for the Software Under Test (SUT). Such harnesses are common to random testing, many kinds of model checking, and various machine-learning influenced approaches [1]. Unfortunately, these harnesses themselves are complex software artifacts and it is all too easy to spend valuable testing time hunting down bugs in the test harness and not the SUT. Harness code is often highly repetitive

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```

@import avl
@import math

@<
def heightOk(tree):
    h = tree.tree_height()
    l = len(tree.inorder_traverse())
    if (l == 0):
        return True
    m = math.log(l,2)
    return h <= (m + 1)
def it(s):
    l = []
    for i in s:
        l.append(i)
    return sorted(l)
@>

source: avl.py

pool: %INT% 4
pool: %AVL% 2 REF
pool: %LIST% 1

log: 3 %AVL%.inorder_traverse()

property: heightOk(%AVL%)
property: %AVL%.check_balanced()

%LIST%:=[]
~%LIST%.append(%INT%)
%INT%:=%[1..20]%
%AVL%:=avl.AVLTree()
%AVL%:=avl.AVLTree(%LIST%)
~%AVL%.insert(%INT%)
~%AVL%.delete(%INT%)
~%AVL%.find(%INT%)
%AVL%.inorder_traverse()

reference: avl.AVLTree ==> set
reference: insert ==> add
reference: delete ==> discard
reference: find ==> __contains__
reference: (\S+)\.inorder_traverse\(\) ==> it(\1)

compare: find
compare: inorder_traverse

```

2. REFERENCES

- [1] A. Groce and M. Erwig. Finding common ground: choose, assert, and assume. In *Workshop on Dynamic Analysis*, pages 12–17, 2012.
- [2] A. Groce and J. Pinto. In *NASA Formal Methods Symposium*, 2015. To appear.