Tutorial:
Functional Testing of Debian Packages

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introduction
automated tests are great and we need more of it
automated tests don't replace all manual testing
topics

• history
• specs
• tools
• functional tests by example
history
autodebtest (0.5.0) unstable; urgency=low

- Initial release [...].

-- Ian Jackson <iwj@...> Fri, 20 Jan 2006 ...
Title: autopkgtest - automatic as-installed package testing
DEP: 8
State: DRAFT
Date: 2012-06-25
URL: http://dep.debian.net/deps/dep8
(kind of; actually points to the autopkgtest git repo)
Title: autopkgtest - automatic as-installed package testing

Abstract:
Establish a standard interface to define and run "as-installed" tests of packages, i.e. the testing of packages in a context as close as possible to a Debian system where the packages subject to testing are properly installed.
( that is great, someone )
( should run that on the )
.o0( whole archive ... )
Debian Continuous Integration comes alive in January 2014

mid-2014: 2 GSOC projects

+ lots of hacking time ...
Debian Continuous Integration

News

- **ruby-parallel 1.0.0.1** FAILED on unstable/amd64 (previously passed)
  2017-03-12 21:11:03 UTC | 15 hour(s) ago

- **libcoap 4.1.2-1** PASSED on unstable/amd64
  2017-03-12 17:15:11 UTC | 19 hour(s) ago

- **grr 3.1.0.2+dfsg-2** PASSED on unstable/amd64
  2017-03-12 16:54:07 UTC | 19 hour(s) ago

- **akonadi 4.16.04.3-4** PASSED on unstable/amd64
  2017-03-12 17:08:44 UTC | 19 hour(s) ago

- **jekyll 3.1.6+dfsg-3** PASSED on unstable/amd64
  2017-03-12 14:16:04 UTC | 22 hour(s) ago

- **ruby-handlebars-assets 2:0.23.1-1** PASSED on unstable/amd64
  2017-03-11 20:17:14 UTC | 2 days ago

- **ruby-handlebars-assets 2:0.23.1-1** FAILED on unstable/amd64
  (previously passed)

Packages

<table>
<thead>
<tr>
<th>3</th>
<th>4</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
<th>i</th>
<th>j</th>
<th>k</th>
<th>l</th>
<th>lib3</th>
</tr>
</thead>
<tbody>
<tr>
<td>liba</td>
<td>libb</td>
<td>libc</td>
<td>lbd</td>
<td>libe</td>
<td>libf</td>
<td>libg</td>
<td>libh</td>
<td>libi</td>
<td>libj</td>
<td>libk</td>
<td></td>
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</tr>
<tr>
<td>libl</td>
<td>libm</td>
<td>libn</td>
<td>libo</td>
<td>libp</td>
<td>libq</td>
<td>libr</td>
<td>libs</td>
<td>libt</td>
<td>libu</td>
<td>libv</td>
<td></td>
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<tr>
<td>libw</td>
<td>libx</td>
<td>liby</td>
<td>libz</td>
<td>m</td>
<td>n</td>
<td>o</td>
<td>p</td>
<td>q</td>
<td>r</td>
<td>s</td>
<td>t</td>
<td>u</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Recent test runs

<table>
<thead>
<tr>
<th>Status</th>
<th>Test Name</th>
<th>Triggers</th>
</tr>
</thead>
<tbody>
<tr>
<td>✗</td>
<td>unity8 on zesty/armhf</td>
<td>Triggers: ubuntu-system-settings/0.4+17.04.20170301-0ubuntu1</td>
</tr>
<tr>
<td>✗</td>
<td>unity8 on zesty/armhf</td>
<td>Triggers: qtmir/0.5.1+17.04.20170307-0ubuntu1</td>
</tr>
<tr>
<td>✓</td>
<td>blktp-dkms on xenial/ppc64el</td>
<td>Triggers: linux-meta-hwe/4.8.0.42.13 blktp-dkms/2.0.93-0.7ubuntu2~16.04.1</td>
</tr>
<tr>
<td>✓</td>
<td>dm-writeboost on xenial/ppc64el</td>
<td>Triggers: linux-meta-hwe/4.8.0.42.13 dm-writeboost/2.1.1-1ubuntu1</td>
</tr>
<tr>
<td>✗</td>
<td>broadcom-sta on xenial/armhf</td>
<td>Triggers: linux-meta-hwe/4.8.0.42.13 broadcom-sta/6.30.223.271-3~16.04.1</td>
</tr>
<tr>
<td>✓</td>
<td>blktp-dkms on xenial/armhf</td>
<td>Triggers: linux-meta-hwe/4.8.0.42.13 blktp-dkms/2.0.93-0.7ubuntu2~16.04.1</td>
</tr>
<tr>
<td>✓</td>
<td>broadcom-sta on xenial/ppc64el</td>
<td>Triggers: linux-meta-hwe/4.8.0.42.13 broadcom-sta/386</td>
</tr>
</tbody>
</table>

### Package Index

You can navigate to `/packages` `/packagename` to get results for a particular package.

```
a  b  c  d  e  f  g  h  i  j  k  l
liba libb libc libd libe libf libg libh
libi libj libk libl libm libn libo libp
libq libr libs libt libu libv libw
libx liby libz m  n  o  p  q  r  s  t  u  v  w  x  y  z```

### Machine readable data

- Currently running tests in JSON format

*http://autopkgttest.ubuntu.com/*
packages in ci.debian.net
~24% of the source packages in the archive is currently being tested (6647/27374) up from ~1% in January 2014
<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Duration</th>
<th>Status</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5.1</td>
<td>2017-03-11 13:41:53 UTC</td>
<td>0h 6m 5s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-10 15:16:51 UTC</td>
<td>0h 6m 14s</td>
<td>pass</td>
<td>debci log</td>
</tr>
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<td>2017-03-09 19:19:30 UTC</td>
<td>0h 6m 10s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-08 23:19:22 UTC</td>
<td>0h 7m 52s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-07 13:35:25 UTC</td>
<td>0h 6m 12s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-07 08:13:50 UTC</td>
<td>0h 5m 39s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-06 08:12:36 UTC</td>
<td>0h 5m 24s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-06 05:03:44 UTC</td>
<td>0h 7m 7s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-05 22:25:06 UTC</td>
<td>0h 6m 33s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-05 14:48:49 UTC</td>
<td>0h 7m 11s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-05 06:16:52 UTC</td>
<td>0h 7m 8s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-04 17:49:16 UTC</td>
<td>0h 6m 13s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-02 18:05:59 UTC</td>
<td>0h 6m 32s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-02 02:52:17 UTC</td>
<td>0h 6m 5s</td>
<td>pass</td>
<td>debci log</td>
</tr>
<tr>
<td>1.5.1</td>
<td>2017-03-01 23:34:50 UTC</td>
<td>0h 6m 2s</td>
<td>pass</td>
<td>debci log</td>
</tr>
</tbody>
</table>
CI data is also in

- UDD/DMD
- DDPO
- package tracker(s)
specs

DEP-8: full text available from
http://dep.debian.net/deps/dep8
debian/control
Source: foo
[...] Testsuite: autopkgtest

debian/tests/control
Tests: foo bar baz
Tests: foo bar baz

foo, bar and baz must be executables in debian/tests/
Test-Command: foo --version \ 
  | grep 'foo version [0-9.]+' 

no need to write one-line shell scripts
Tests: test-my-package

Depends: @, test-tool

install extra dependencies
Tests: test-my-package
Depends: @, test-tool

Tests: smoke-test

tests with different characteristics
Tests: upstream-tests

Depends: @, @builddeps@

need build dependencies to run tests
Tests: my-tests

Restrictions: [...]

additional requirements for tests
Tests: break-the-world
Restrictions: breaks-testbed

testbed will not be reused for other tests
Tests: play-with-danger
Restrictions: needs-root

_tests need to be run as root_
_(think twice before doing this)_
Tests: complain-but-succeed
Restrictions: allow-stderr

does not fail if test program produces output on stderr
Tests: mess-with-services
Restrictions: isolation-container

skip if testbed is not at least as isolated from the host system as a container
Tests: mess-with-kernel
Restrictions: isolation-machine

skip if testbed is not at least as isolated from the host system as a VM
Tests: test-extra-features
Restrictions: needs-recommends

installs Recommends: into the testbed
tools
sadt(1) from devscripts

$ sadt

runs tests from source package at current directory, on the current system — somewhat limited

currently needs ♥ (python3)
autopkgtest(1) from autopkgtest

Usage:

$ autopkgtest [options] \n  -- [virt. args]
$ autopkgtest -B -- null

runs the tests from the source package at the current directory, without building it first, on the current system (i.e. "null" virtualization)

alias a='autopkgtest -B -- null'
$ autopkgtest -u debci \\n/path/to/foo_1.2.3-1_amd64.changes \\n-- schroot debci-unstable-amd64

run tests from the source referenced by the changes file, using its binaries, under a user called debci, in a schroot(1) session based on the debci-unstable-amd64 chroot
$ autopkgtest -u debci \\
 /path/to/foo_1.2.3-1_amd64.changes \\
 -- lxc adt-sid-amd64

also supported: qemu, ssh
requested: pbuilder, docker
functional tests
by example

(plus tips and tricks)
tip 1: shunit2(1)
redmine

tip 4: testing services
a random Ruby package
(let's try ruby-barby)

tip 5: autodep8(1)
autodep8(1)

automatically generates debian/tests/control at runtime for well-known groups of packages. Called by autopkgtest.

Supported: Ruby, Perl, Python, NodeJS, Kernel module (DKMS), R, Emacs Lisp (ELPA)
tip 6: adding DEP-8 tests for sets of similar packages
debci

tip 7: running "upstream" test suite
vagrant

tip 8: really simple smoke tests
tip 9:

$ autopkgtest --shell
$ autopkgtest --shell-fail
conclusions
Join the automated testing movement

- add tests to your packages
- add generic tests for your packaging team to autodep8
- help improving/maintaining ci.debian.net
learn more

https://ci.debian.net/doc/
contact

terceiro@debian.org

terceiro on OFTC
  #debian-qa
  #debian-devel