ABI Compatibility verifier in Fedora: Status report

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Agenda

- Fedora ABI compatibility verifier design
- ABI analysis framework
- Bodhi updates gating project
- Future directions

ABI verifier design

- Based on Taskotron
- For each new Koji Build task-abicheck is fired
  - https://fedoraproject.org/wiki/Taskotron/Task/dist.abicheck
  - ABI of shared libraries compared to previous build
  - Maintainers are notified with the result
    - FAILED, NEED_INSPECTION, PASSED.
    - ***Caveat***: To get notified, you need to flip switches at https://apps.fedoraproject.org/notifications
  - Test results are available in Bodhi update interface of each package under the “Automated Tests” tab.
    - For instance: https://bodhi.fedoraproject.org/updates/FEDORA-2018-1e0733ee2b

Underlying ABI analysis framework: Libabigail 1/3

- ABI Generic Analysis & Instrumentation Library
- Loads an ELF binary and its debug info
- Builds internal representation of exported interfaces and their types (ABI)
- Compare internal representations of ABIs
- Builds internal representation of ABI changes
- Analyse & categorize ABI changes
  - Possibly take suppression into account
- Report ABI changes

Underlying ABI analysis framework: Libabigail 2/3

- Several tools built using the library
  - abipkgdiff
    - Compares ABI of binaries in RPMs
      - Needs debug info RPMs
    - Can take -devel RPMs into account
  - abidw
    - Emits a textual representation of the ABI of a binary
      - Called .abixml file
  - abidiff
    - Compares ABIs of two binaries
    - Compares ABIs of a binary against an .abixml file
    - Useful to build an ad-hoc ABI verifier in upstream projects
  - Fedabipkgdiff
    - Compares the ABI of a fedora build against another one which is in Koji
    - User doesn’t need to download all packages by hand
    - Useful to test ABI compatibility at package building time

Underlying ABI analysis framework: Libabigail 3/3

- Task-abicheck uses abipkgdiff
  - Compares the new package against the old one
    - Gets the debug info and the -devel package
  - -devel package useful to define public interfaces
    - abipkgdiff auto-suppresses changes related to non-public interfaces
  - 3 kinds of ABI changes possibly detected:
    - ABI-incompatible changes: FAILED
    - ABI-compatible changes (or no change): PASSED
    - Changes we are not sure about: NEED_INSPECTION

Bodhi update gating project 1/3

- Package updates now gated by some Taskotron tasks
- We want to prevent packages with incompatible ABI changes from being pushed to users
- We tried to use ***task-abicheck*** as a gate
- It failed :-(
  - Too much false positives
    - Leading to the release gate being closed to often for some packages

Bodhi update gating project 2/3

- False positives mainly due to:
  - abipkgdiff analysing all shared libraries including the private ones
- What does a private shared library mean?
  - There is no concept of private shared library in ELF
  - Yet, the Libreoffice package (for instance) contains tens of shared libraries intended to be used by the package itself
- We came out with two heuristics:
  - Only analyse shared libraries present in the “provides” property of the RPM
    - Implemented inside abipkgdiff itself
  - If an RPM has no associated -devel package then don’t analyse it
    - Implemented in task-abicheck

Bodhi update gating project 3/3

- The two heuristics are in production since Libabigail 1.4 (July 2018)
  - We can try to use task-abicheck as a gating test again
    - We’ll probably need a testing period where the result won’t be blocking?
    - What do you think?
- Packagers can include .abignore files inside RPMs to tell the verifier to ignore some ABI changes.

Future directions

- Speed improvements
  - Investigate loading (parts of) binaries in parallel
    - We always need to load two binaries for comparison
    - Challenging because we build models that are common to the binaries that are loaded.
- Linux Kernel ABI change analysis
  - kmidiff tool was recently developed
    - Compares changes in “kernel/module interfaces” (aka KMI) across two Linux kernels
    - Possibly useful for **stable** Fedora kernels?
- Fancy web reports
  - Would be super powerful to analyse changes
  - Volunteers?
  - C’mon, do not be afraid! :)
- Better CI for Libabigail
  - Would be nice to automatically run https://pagure.io/libabigail-selfcheck on each commit
    - Requires huge disk space (and RAM) as it runs on all critpath packages
    - Volunteers?

Thank you all !

Questions ?
(okay, here are some useful links below)

- https://fedoraproject.org/wiki/Taskotron/Tasks/dist.abicheck
- https://taskotron.fedoraproject.org/resultsdb/results?testcases=dist.abicheck
- https://sourceware.org/libabigail/apidoc