Am I Breaking My Client's Code?

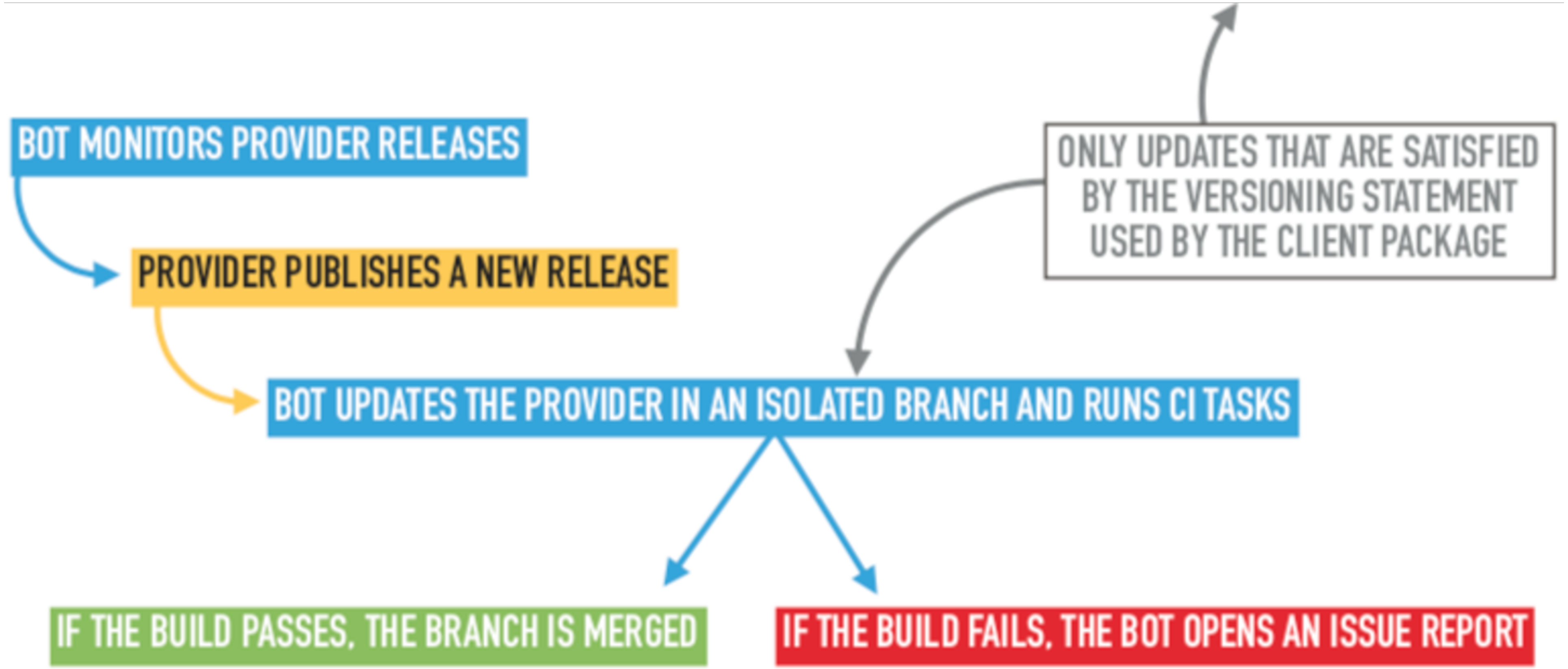
A case study on Greenkeeper Breaking Changes

Progress Presentation

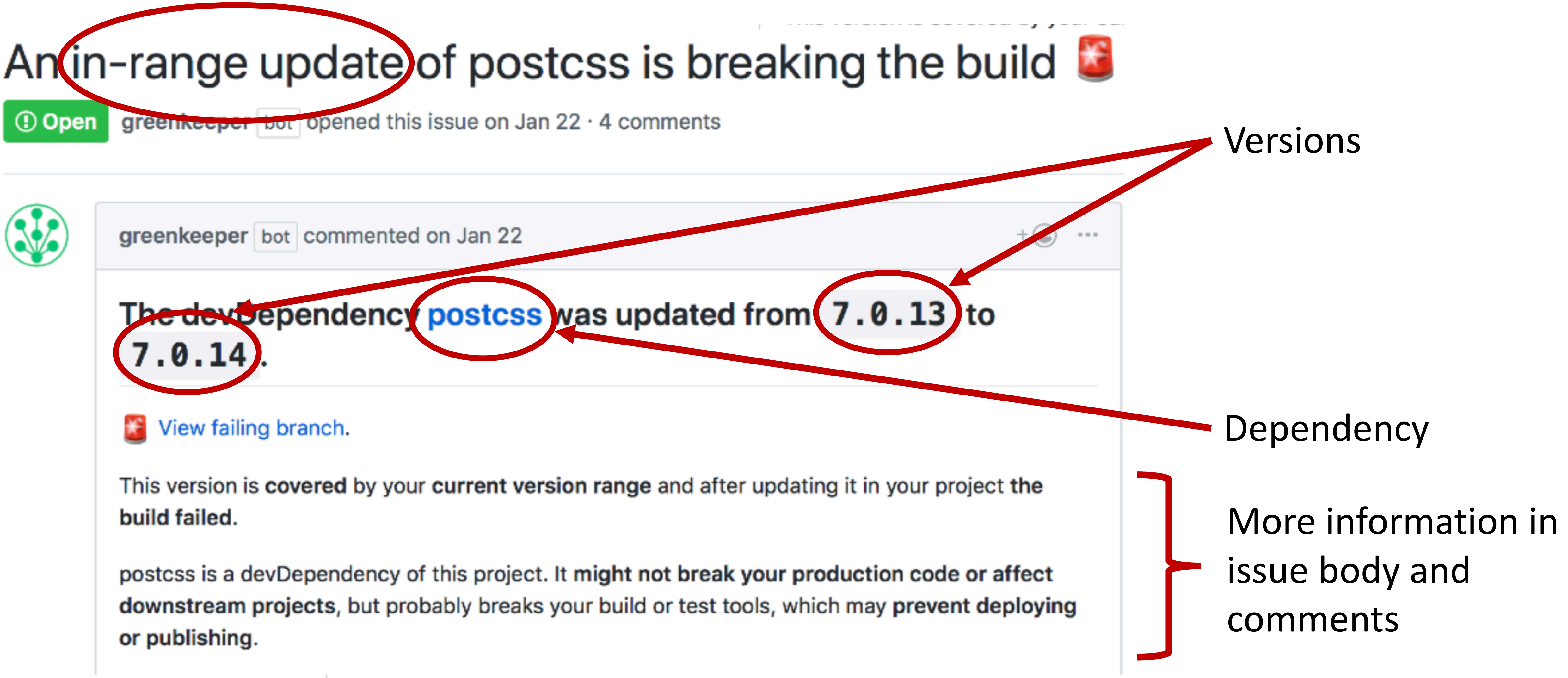
Benjamin Rombaut
MSc Candidate
Software Analysis & Intelligence Lab
Queen's University

Dependencies & Breaking Changes

How does Greenkeeper detect build breakages of implicit updates?


BOT MONITORS PROVIDER RELEASES
PROVIDER PUBLISHES A NEW RELEASE
ONLY UPDATES THAT ARE SATISFIED BY THE VERSIONING STATEMENT USED BY THE CLIENT PACKAGE
BOT UPDATES THE PROVIDER IN AN ISOLATED BRANCH AND RUNS CI TASKS
IF THE BUILD PASSES, THE BRANCH IS MERGED
IF THE BUILD FAILS, THE BOT OPENS AN ISSUE REPORT

Greenkeeper



An in-range update of postcss is breaking the build 🚨

ⓘ Open greenkeeper bot opened this issue on Jan 22 · 4 comments

greenkeeper bot commented on Jan 22

The devDependency postcss was updated from `7.0.13` to `7.0.14`.

🚨 View failing branch.

This version is **covered** by your **current version range** and after updating it in your project **the build failed.**

postcss is a devDependency of this project. It **might not break your production code or affect downstream projects**, but probably breaks your build or test tools, which may **prevent deploying or publishing**.

Versions

Dependency

More information in issue body and comments

Determine how providers break their clients & how clients resolve these breakages

RQ1: *What types of changes break a client’s build?*

RQ2 *How do client packages recover from a build breakage?*

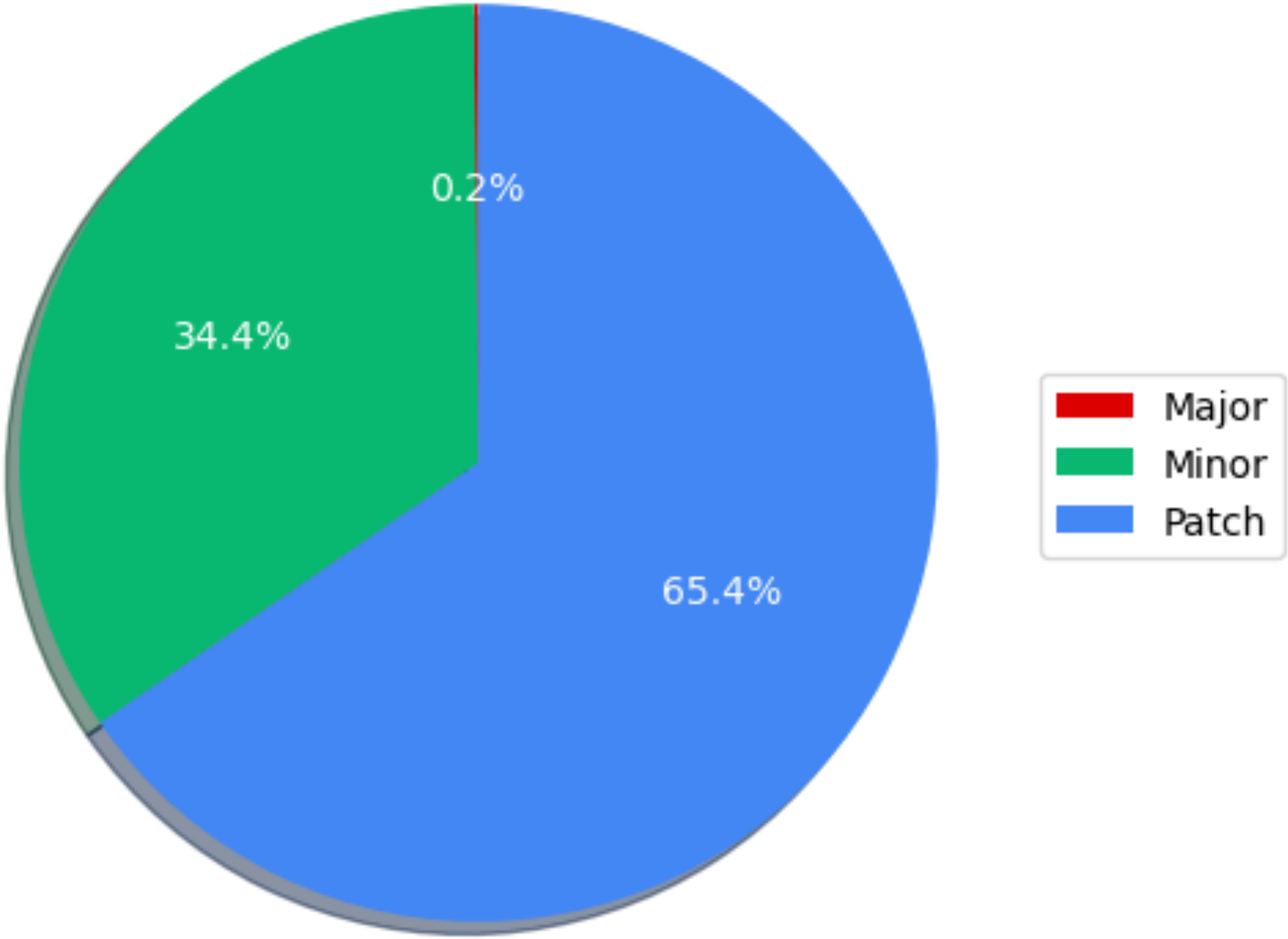
RQ3: *To what extent do issue reports filed with a provider package originate from a broken build in a client?*

Data Set

- Package Dependencies Lists (12,005)
- Breaking Build Issue Reports (123,197)
  - Created between October 2016 – June 2020
- Comments on the Issue Reports (365,625)
- Events for the Issue reports (209,750)
  - E.g. “Referenced”, “Mentioned”, “Closed”, etc.
- Commits that reference the Issue Reports (17,623)

RQ1: Most Breaking Changes are Patch Updates – With Some Caveats

- 65% of Greenkeeper issues have had their update type extracted.
- Providers usually make far more Patch and Minor updates than Major updates – will need to examine the proportion of change types on breaking builds.
- Does frequency of releases influence breaking frequency?

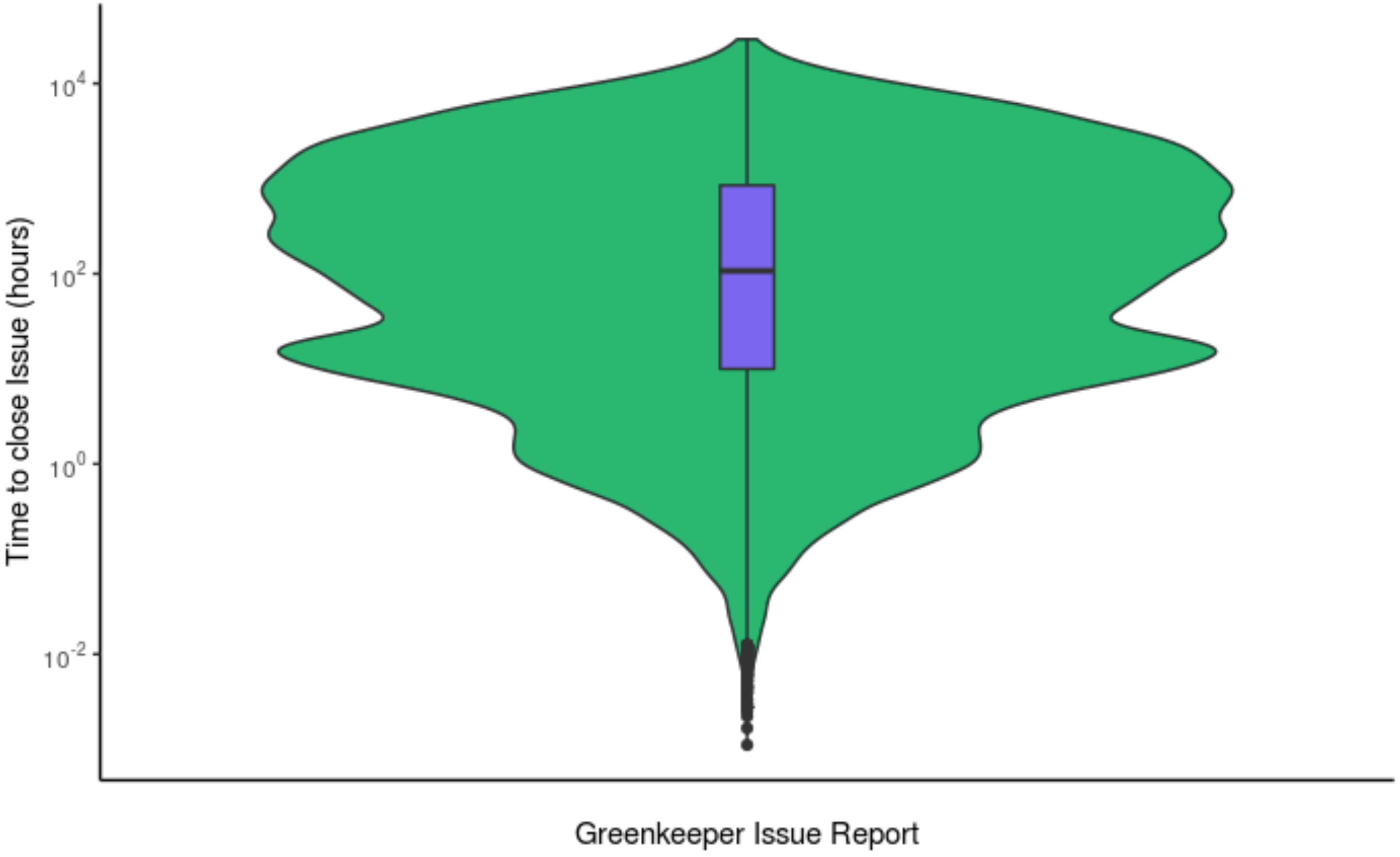


RQ2: Four Days is the Median Time for Breaking Issues to be Resolved

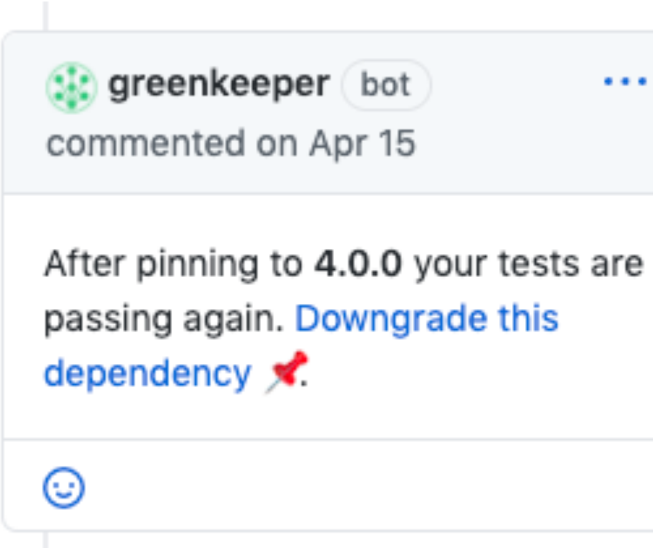
- 80% of build failure issues are eventually closed.
- The median time to close the issue is 107 Hours (4 days & 11 hours)

Five Number Summary for Time-to-Close (X Days HH:MM)

Min	25%	50%	75%	Max
0 Days 00:04	0 Days 09:58	4 Days 11:04	35 Days 07:48	1219 Days 02:01



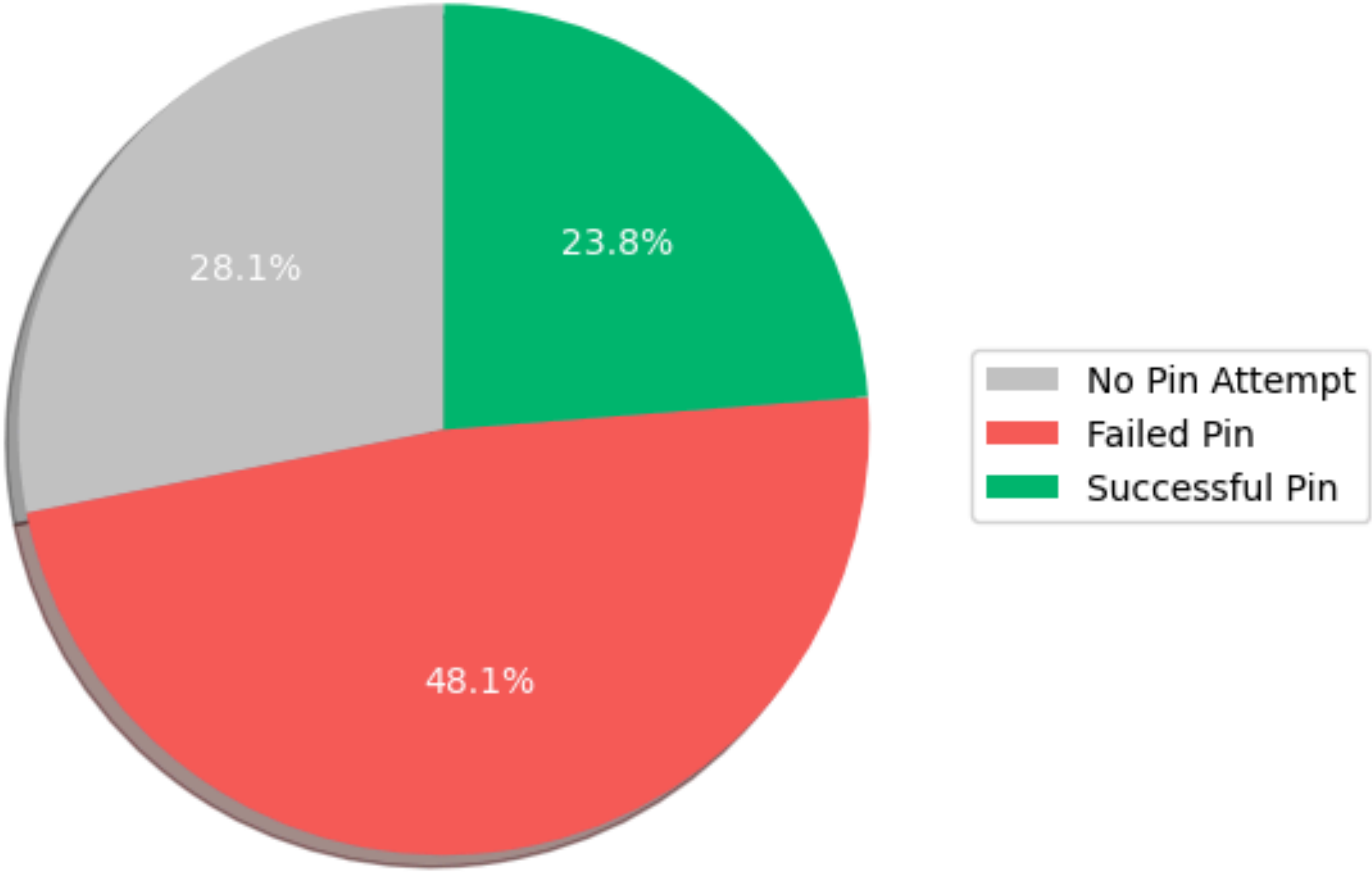
RQ2: Quick Fix – Pinning the Dependency Not As Successful As You Would Think



greenkeeper bot

commented on Apr 15

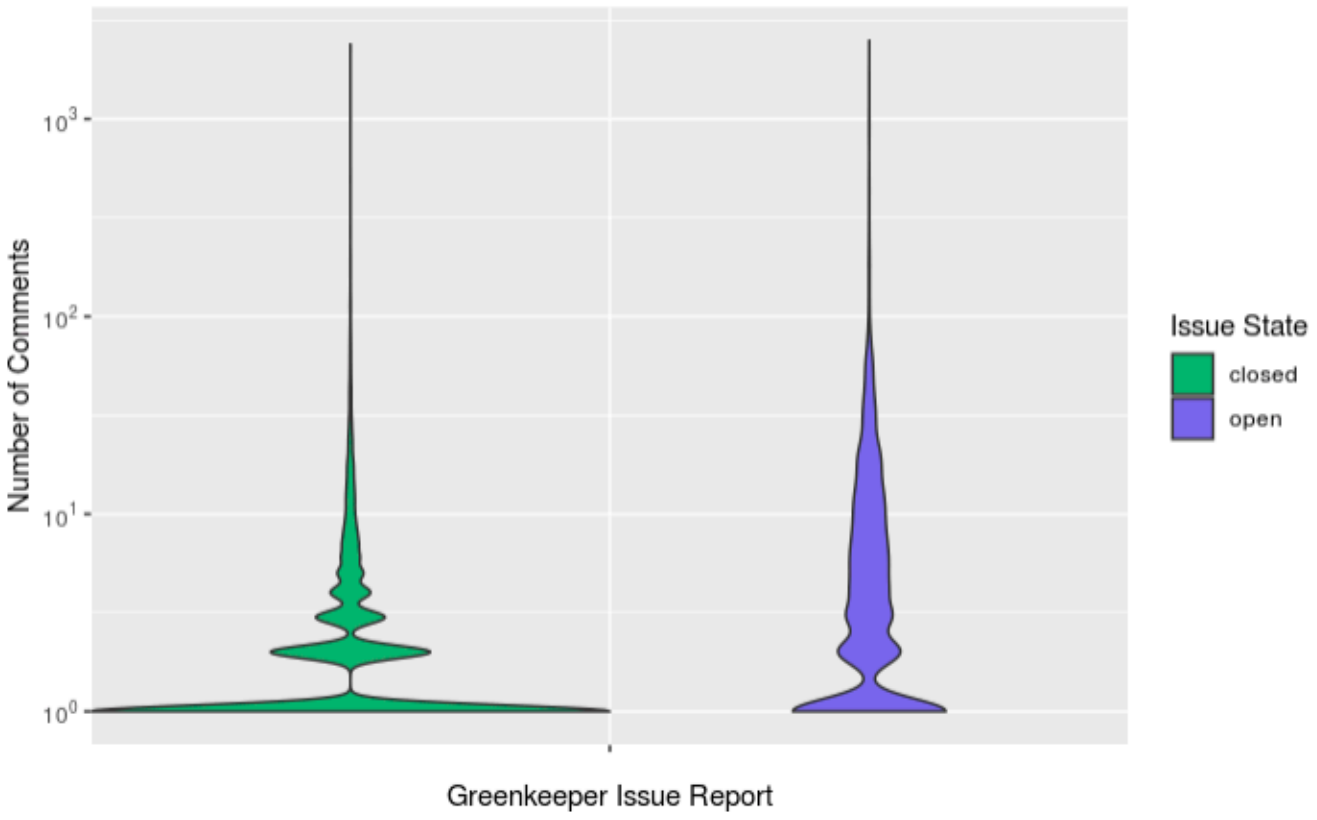
After pinning to **4.0.0** your tests are passing again. Downgrade this dependency 📌.



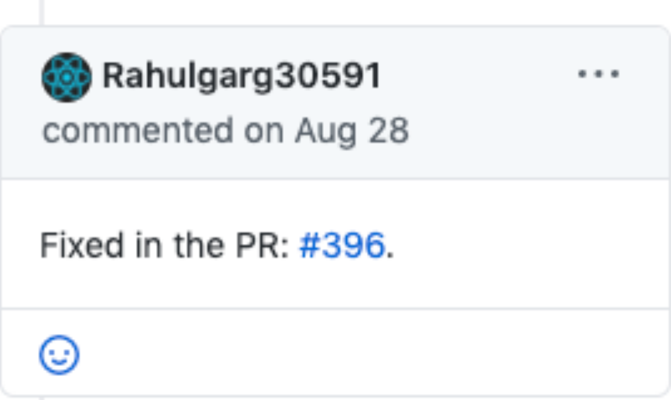
RQ2: Most Activity on Breaking Issues Comes From the Bot Itself

- 86% and 48% of issues have at least 1 and 2 comments, respectively.
- 97% of comments are from the Greenkeeper bot.
- 8% of breaking issue reports have at lease one comment from a user.

Five Number Summary - Number of Comments On Issues				
Min	25%	50%	75%	Max
0	1	1	3	2500

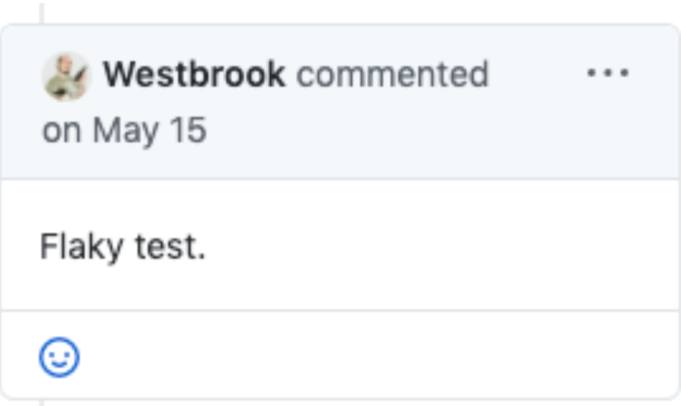


RQ2: User Comments



Rahulgarg30591 commented on Aug 28

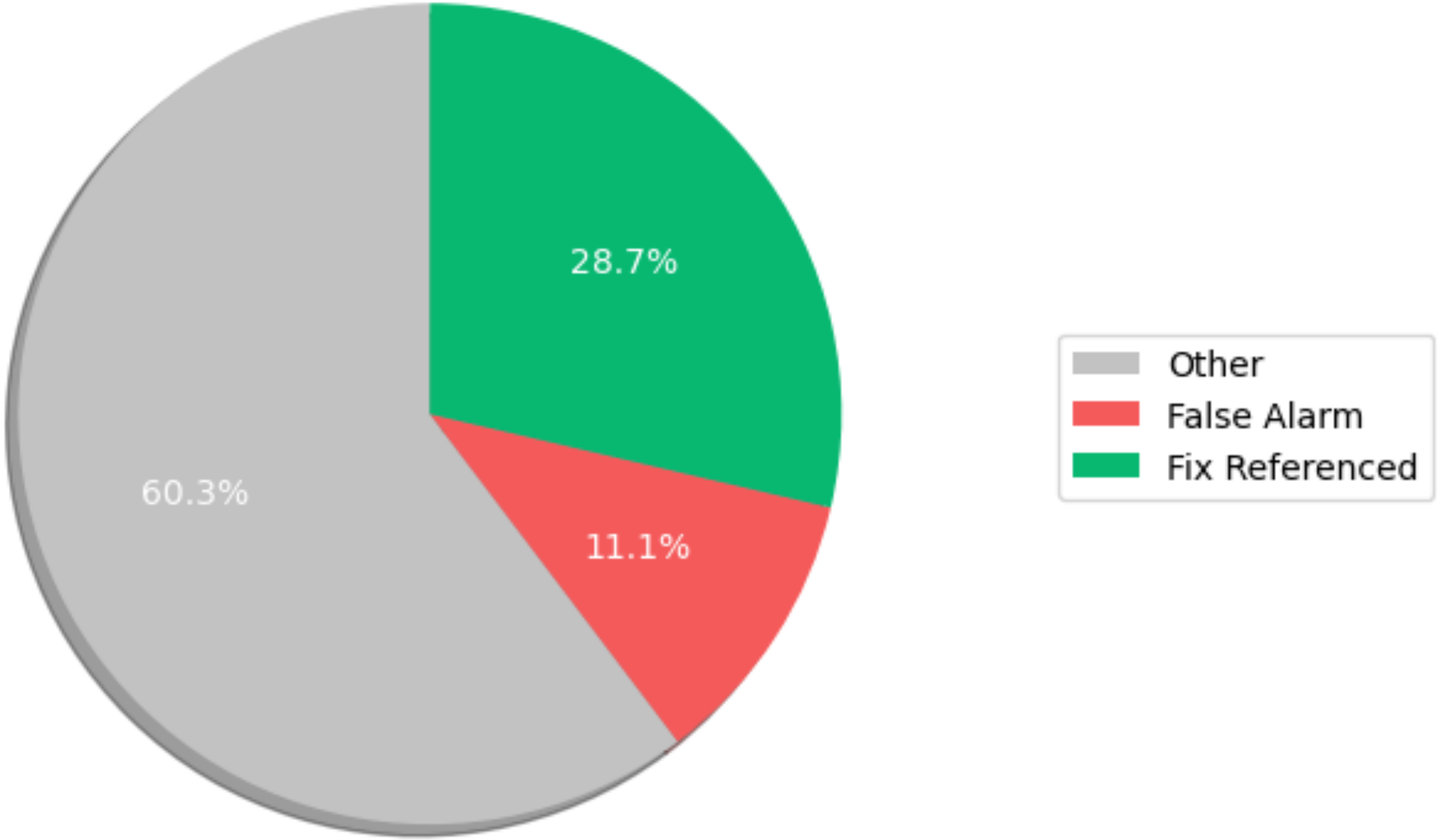
Fixed in the PR: #396.



Westbrook commented on May 15

Flaky test.

DeFlaker, anyone?



Left To Do

- **RQ1:** ***What types of changes break a client's build?***
  - Frequency of provider releases.
  - Manual analysis on sample of provider release notes to characterize types of breaking changes.
- **RQ2: How** ***do client packages recover from a build breakage?***
  - Analyze referenced commits to see what types of changes clients are performing to recover from a breakage.
  - Classify remainder of user comments.
- **RQ3:** ***To what extent do issue reports filed with a provider package originate from a broken build in a client?***
  - Not started