



TDD

ALL CODE IS GUILTY
UNTIL PROVEN INNOCENT

Testing is Confidence

A Developer's Perspective

Brian Demers
Open Source Developer

 BrianDemers  bdemers

 Gradle

Who is this guy?



Java™
Champions



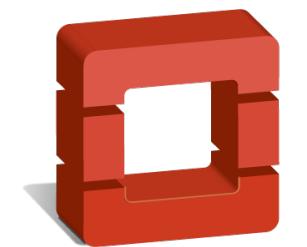
Warner River
Bees



codemonkey.fm



Apache Directory



openstack™



Maven™

Sonatype
Nexus







vs.



<https://www.skinsee.com/learn-to-ski-or-snowboard>



VS



source: catdepot.org



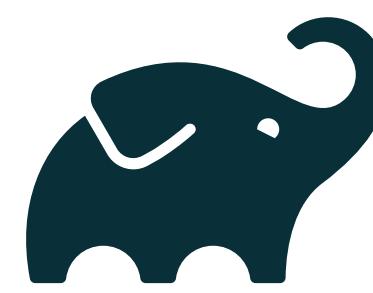
Gradle Build Tool

VS

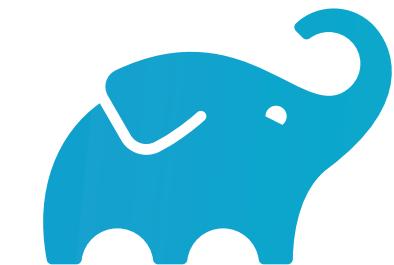
Maven™



Gradle

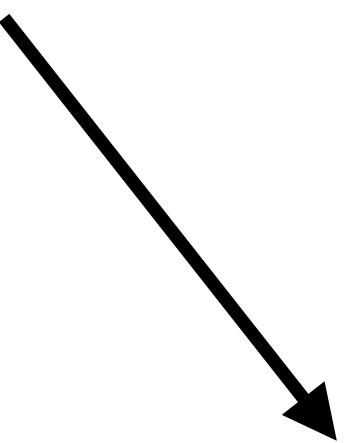
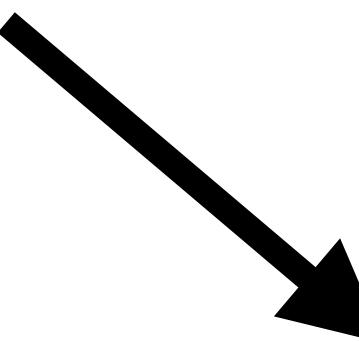
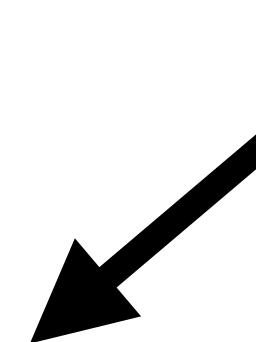


Gradle Build Tool



Gradle Enterprise

Developer
Productivity
Engineering



Gradle Build Tool

MavenTM

Bazel

sbt

Topics

- Why do we test ?
- Types of Testing
- Flaky Tests
- Developer Productivity
- Best Practices

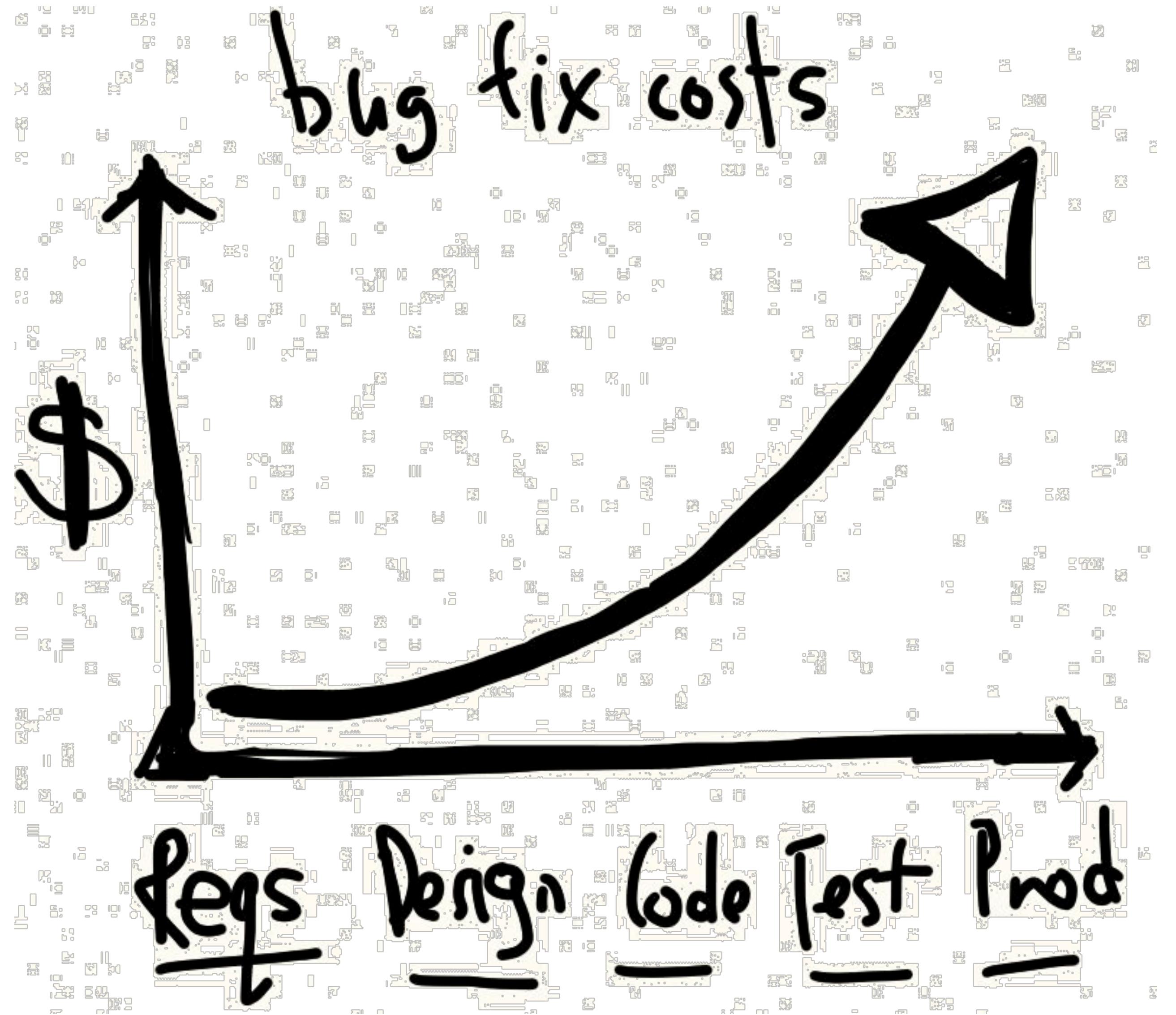
Why do we test ?



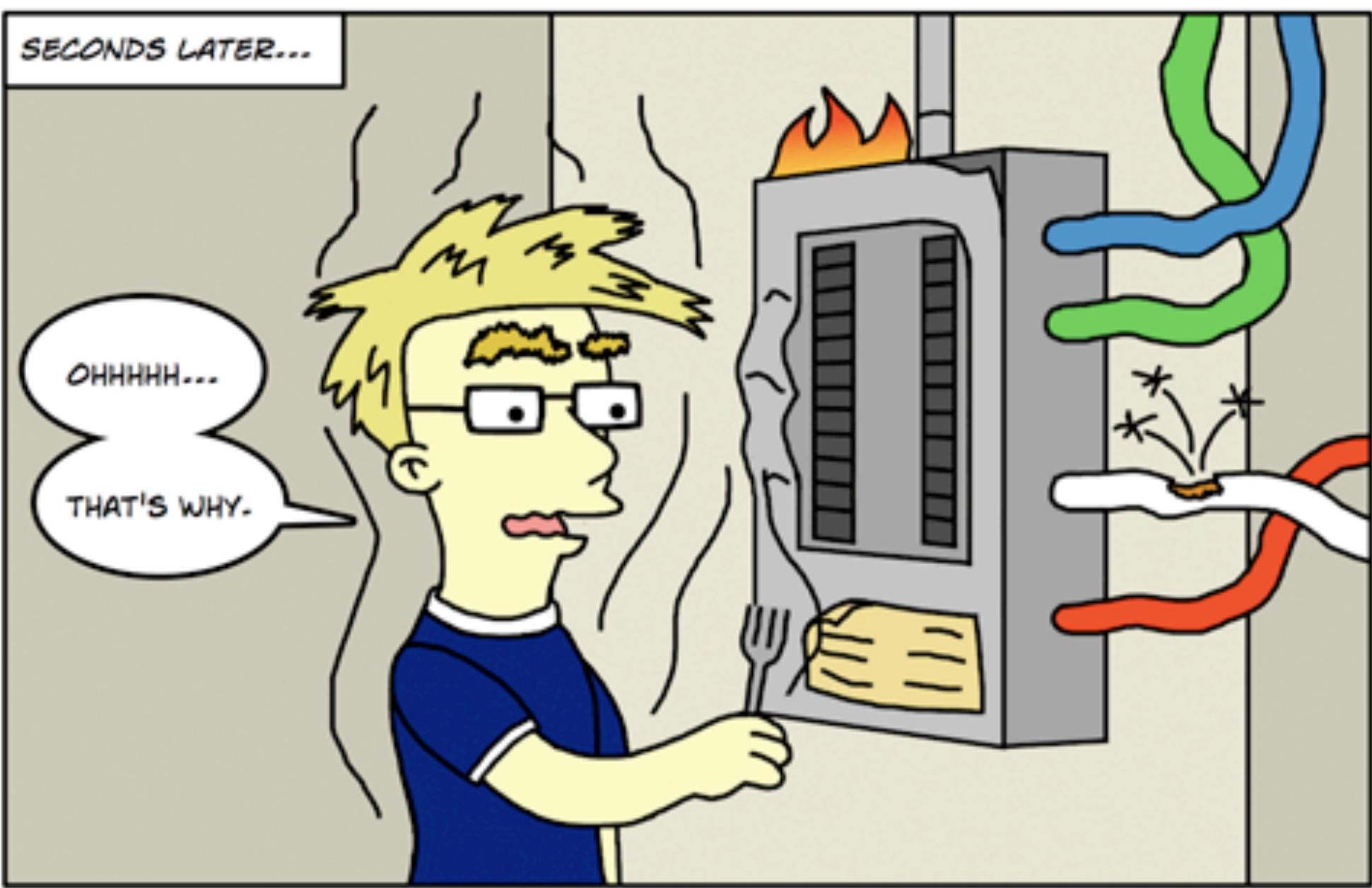
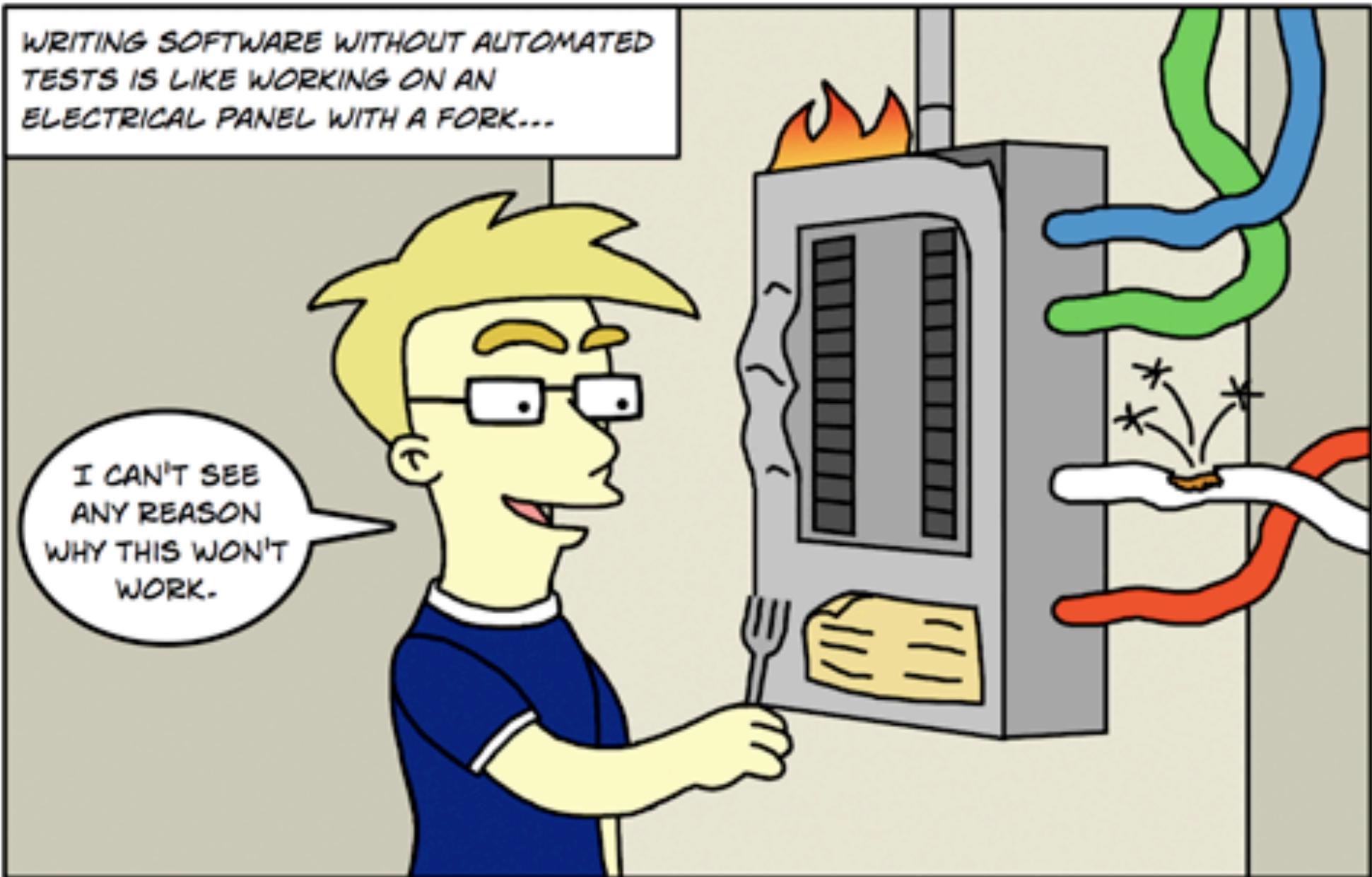
LEGACY CODE

Welcome to the project!
Here's the codebase.

seantheflexguy.com/blog



Why do we test ?



© 2008 Leonard Nooy

Testing is Confidence



Types of Testing

- Manual
- Unit
- Integration
- Functional
- Non-Functional

Manual Testing

Usability

Filling in the non-automated gaps

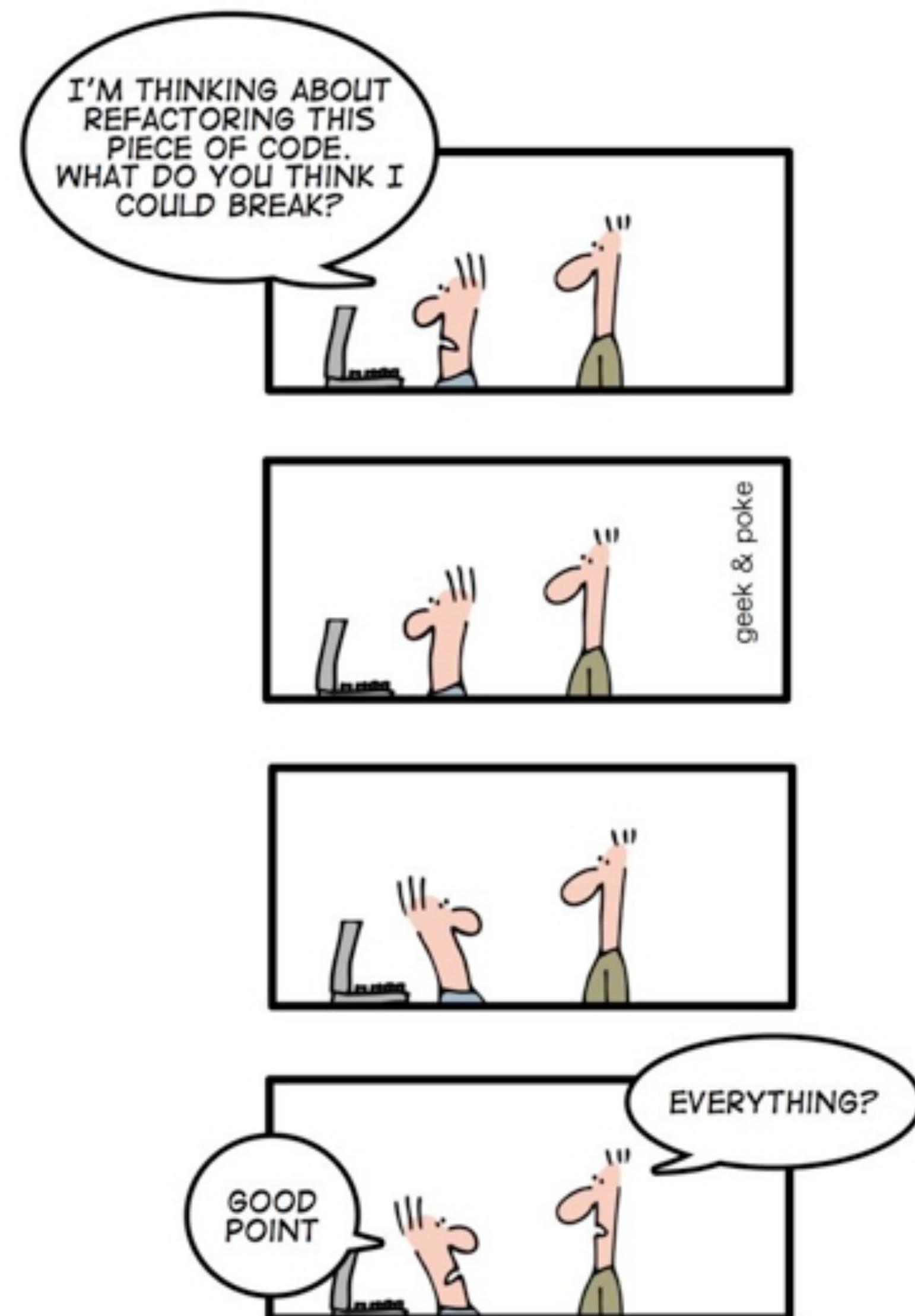
Exploratory

Unit Testing

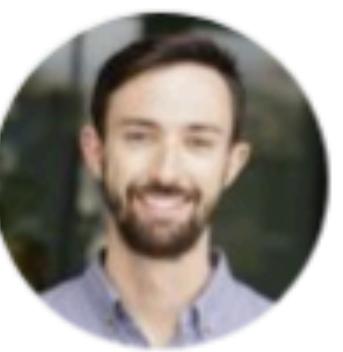


- Tests for isolated chunks of code
- NO external dependencies
- Fast

You cannot refactor without unit tests



What to Test ?



Brenan Keller

@brenankeller · [Follow](#)



A QA engineer walks into a bar. Orders a beer. Orders 0 beers. Orders 999999999999 beers. Orders a lizard. Orders -1 beers. Orders a ueicbksjdhd.

First real customer walks in and asks where the bathroom is. The bar bursts into flames, killing everyone.

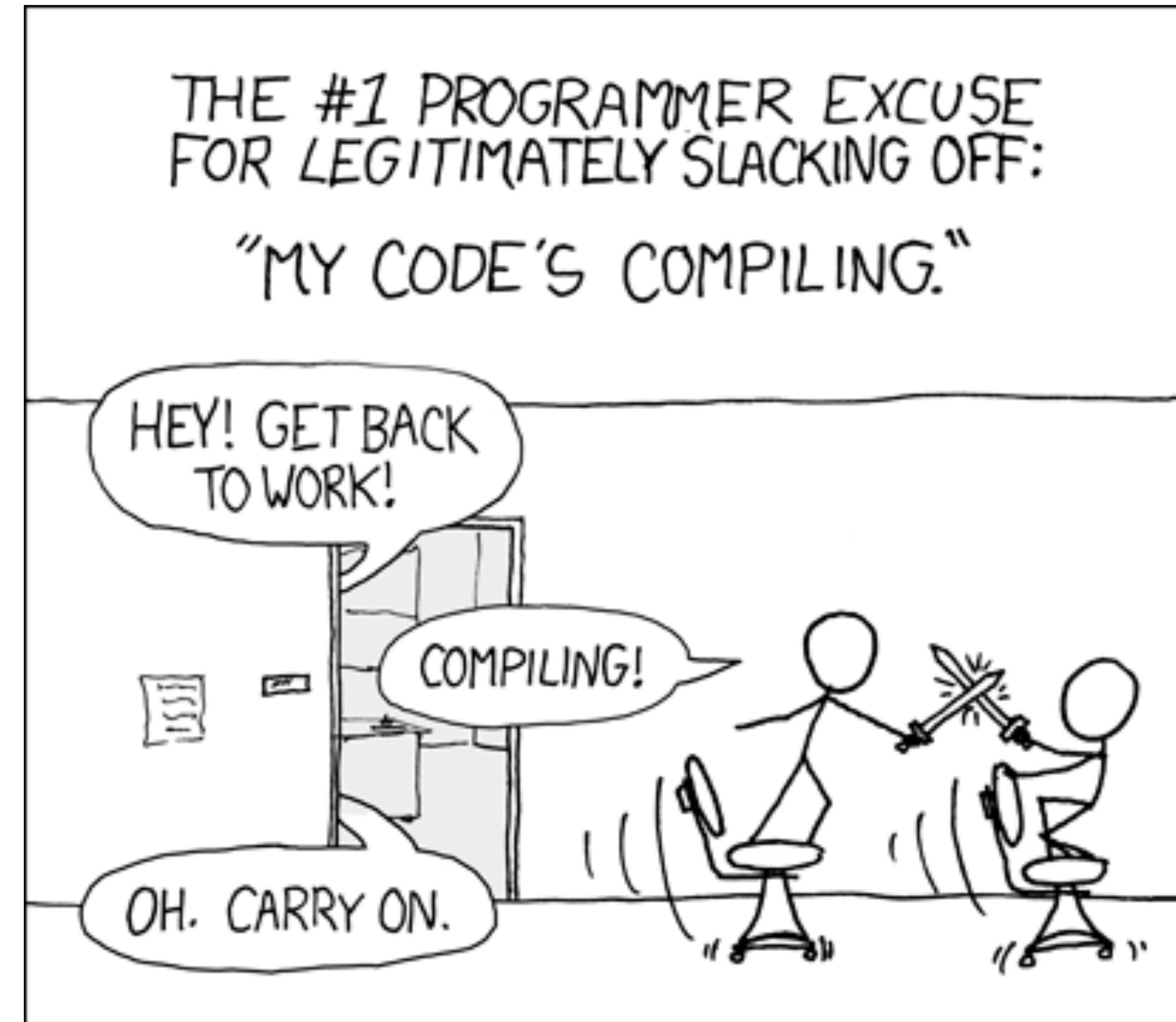
4:21 PM · Nov 30, 2018



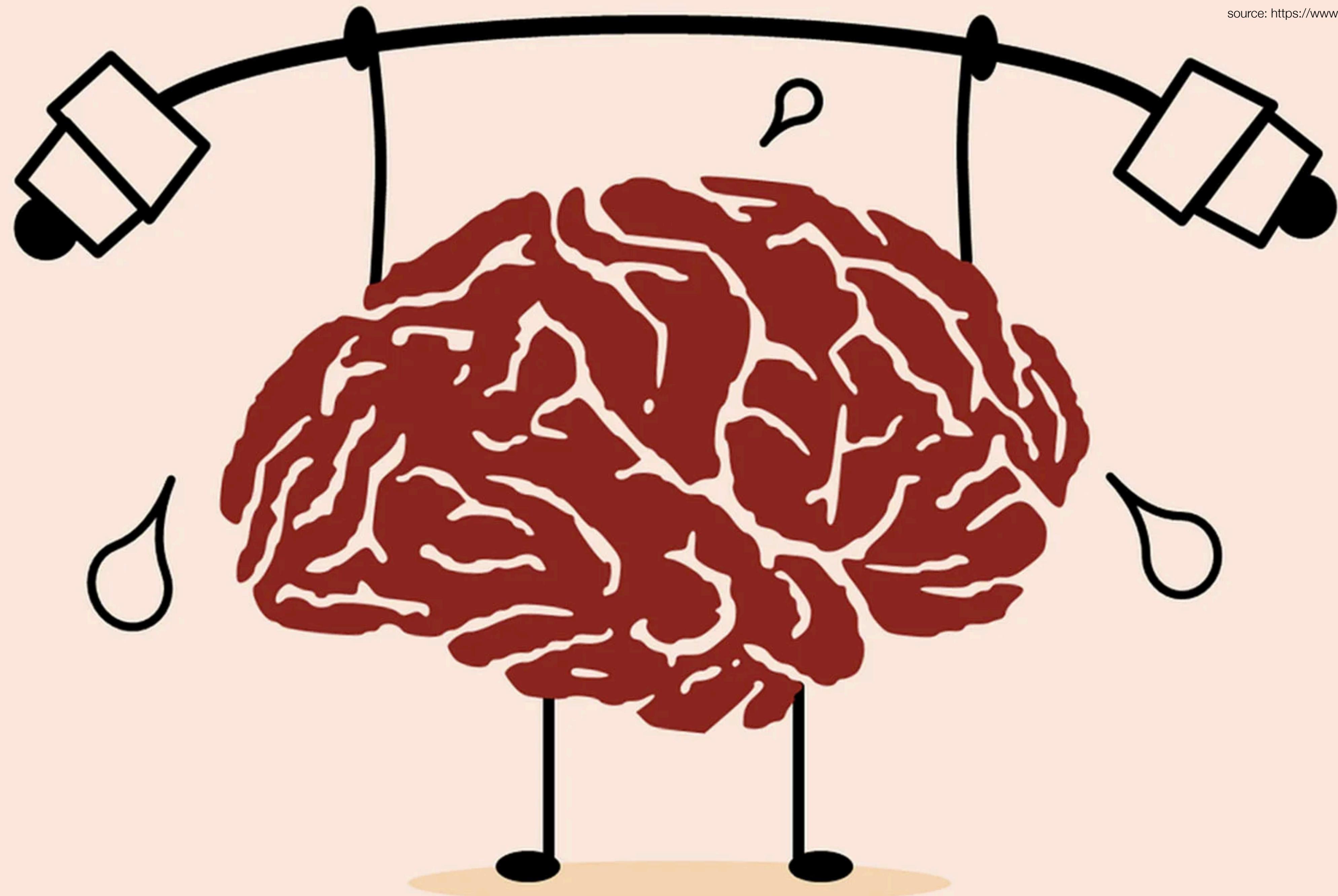
Example Code

```
public User addUser(String firstName, String lastName) {  
    String username = firstName.charAt(0) + lastName;  
    return database.createUser(username, firstName, lastName);  
}
```

Unit Tests must be FAST to avoid context switching



source: xkcd.com/303



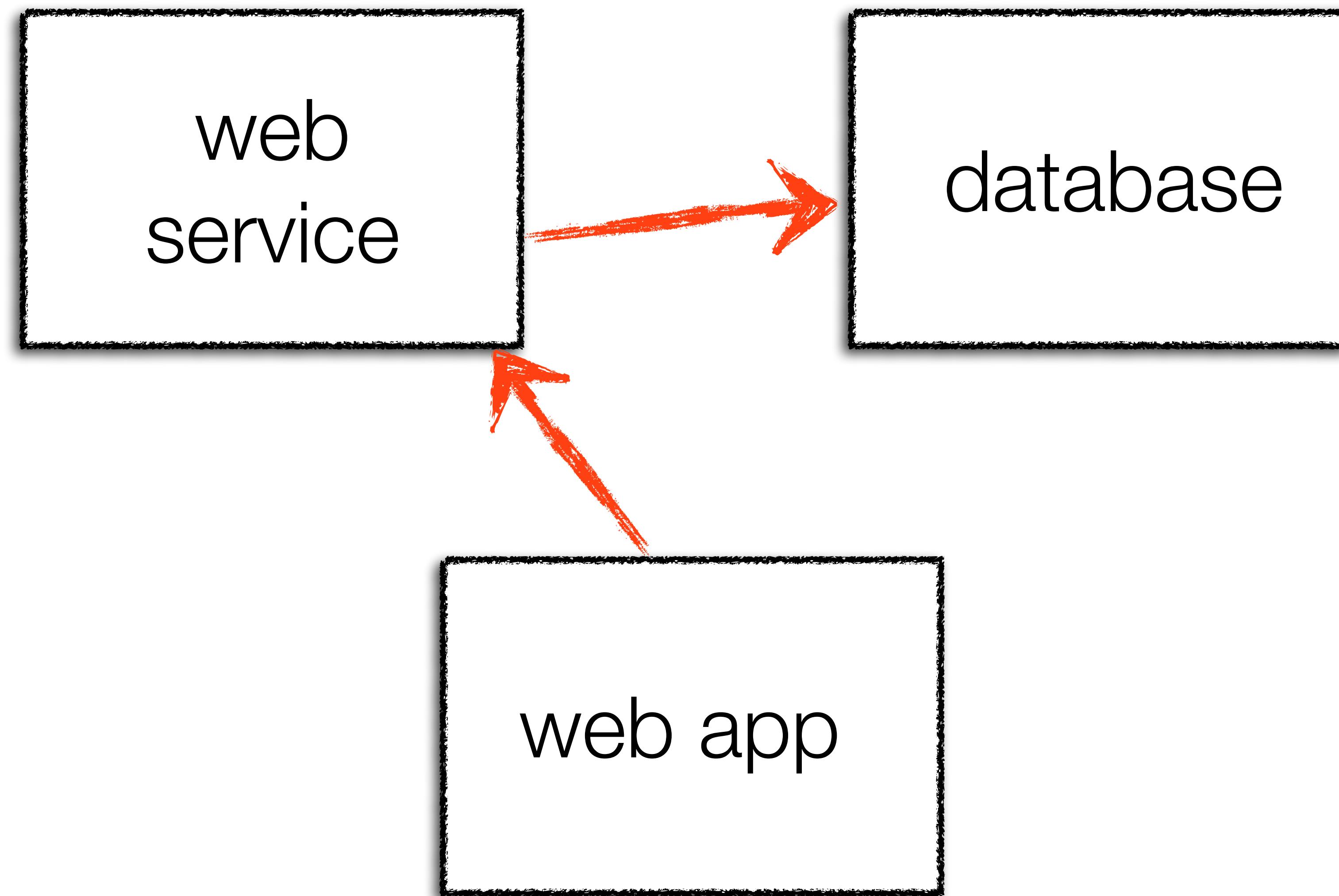
Integration Tests

Aggregates chunks of code and tests them together

High Level Tests

Has external dependencies

Test the Interactions

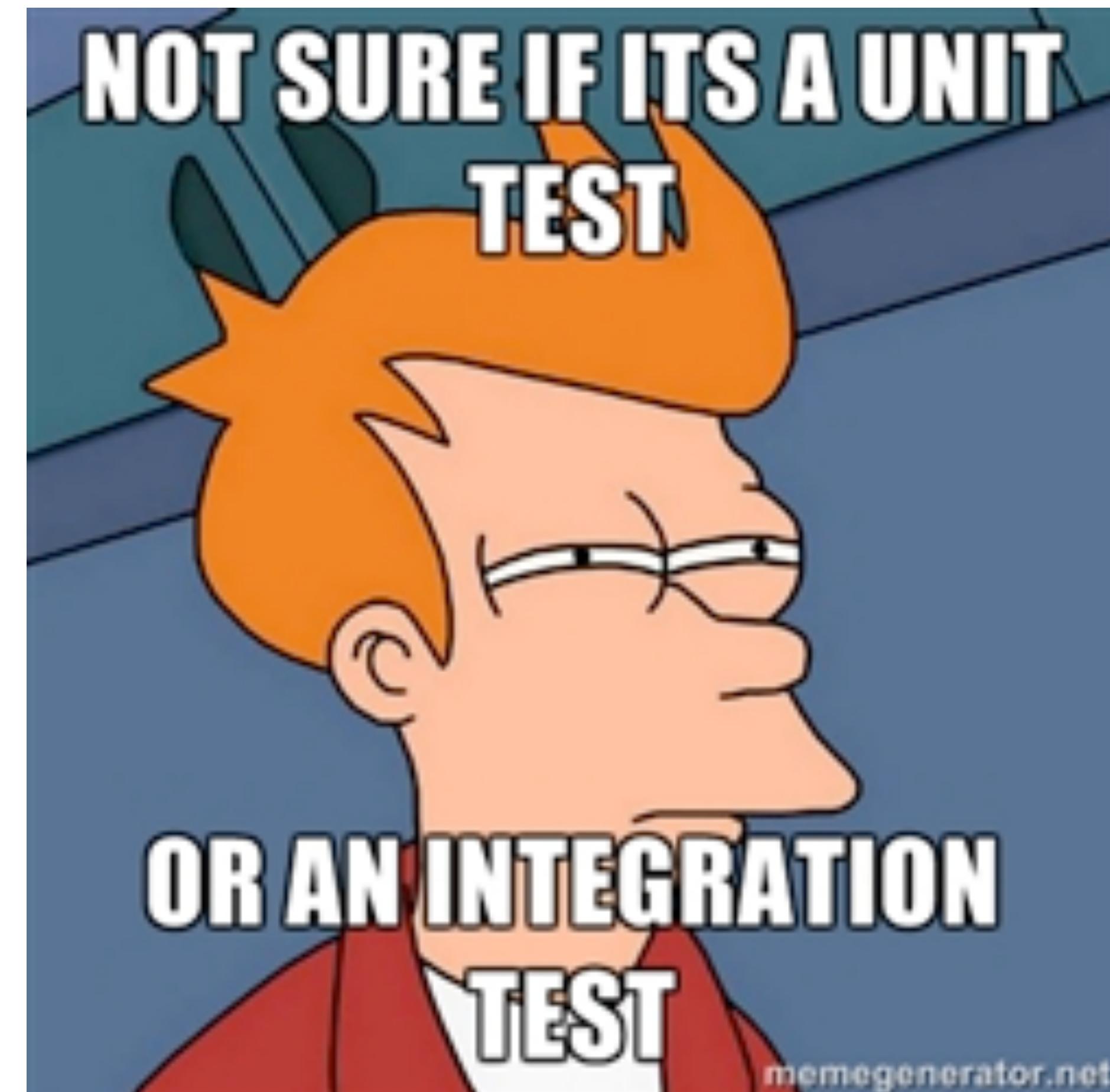


Build Time

```
[INFO] Java SDK ..... SUCCESS [ 2.991 s]
[INFO] Java SDK :: Swagger Templates ..... SUCCESS [ 2.539 s]
[INFO] Java SDK :: API ..... SUCCESS [ 7.532 s]
[INFO] Java SDK :: Impl ..... SUCCESS [ 18.842 s]
[INFO] Java SDK :: Extensions :: HTTP Client ... SUCCESS [ 11.552 s]
[INFO] Java SDK :: Integration Tests ..... SUCCESS [04:31 min]
[INFO] Java SDK :: Examples ..... SUCCESS [ 0.036 s]
[INFO] Java SDK :: Examples :: Quickstart Code .. SUCCESS [ 7.390 s]
[INFO] Java SDK :: Coverage ..... SUCCESS [ 1.401 s]
```

Component Tests

(anti-pattern)



memegenerator.net

Component Tests

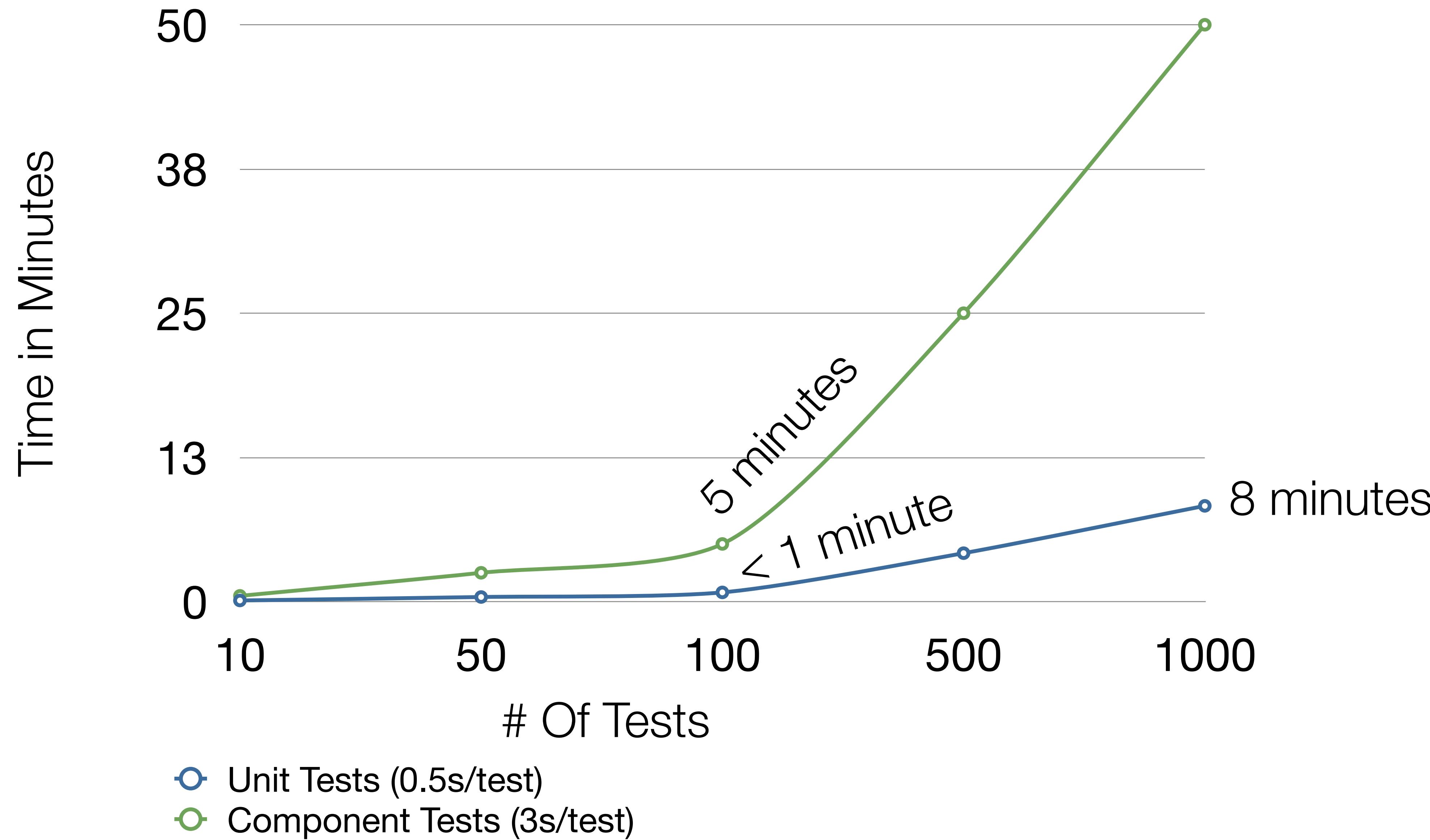
(Not always bad)

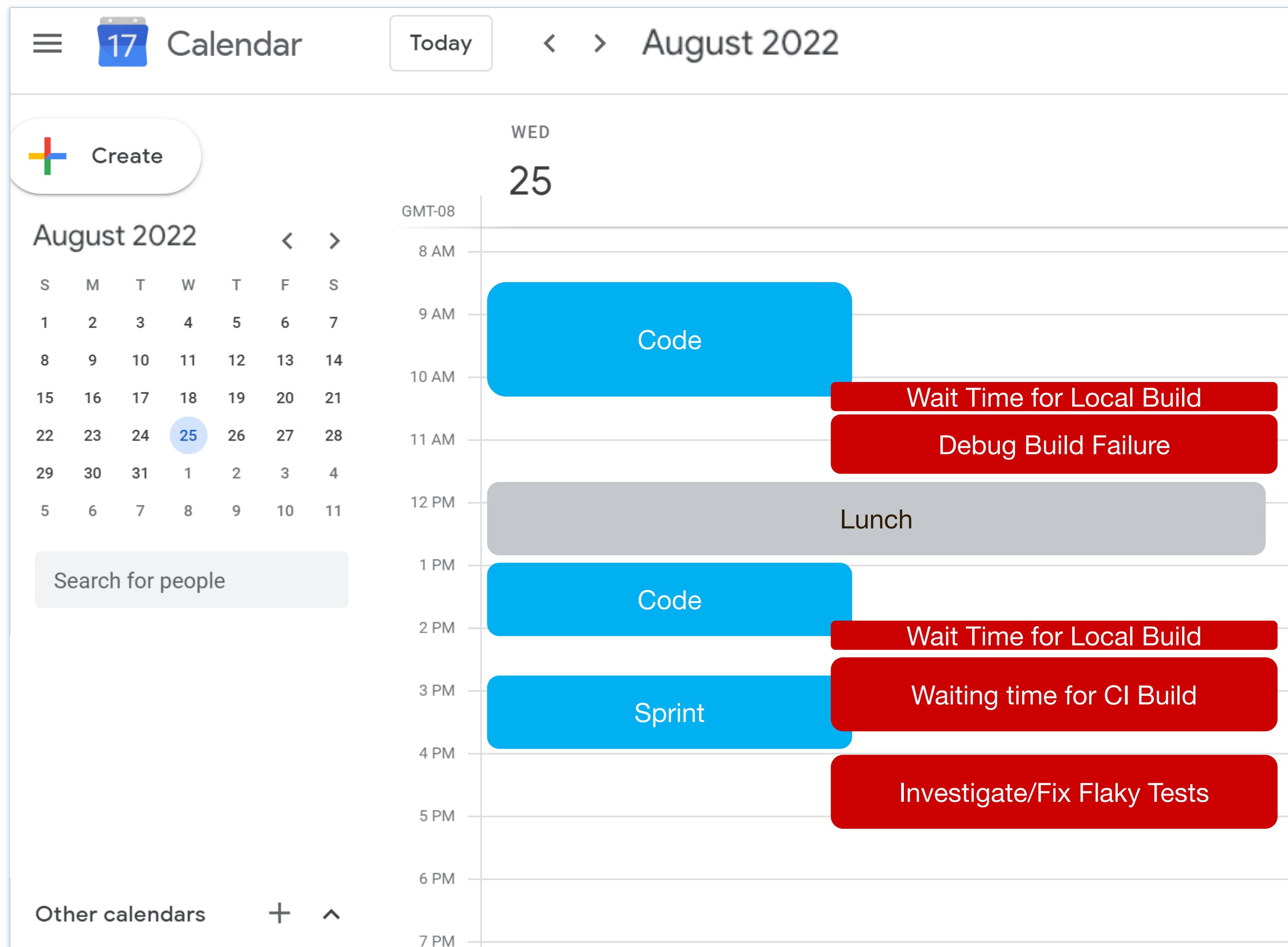
Spring & Guice Binding

Integrating with Systems

Custom Database Logic

Unit vs Component Tests





Who tracks local build times?

GRADLE ENTERPRISE CUSTOMER STATISTIC

Builds and Tests are Slow!

92% of surveyed IT organizations experienced challenges with too much time spent waiting on build and test feedback.



Source: TechValidate survey of 26 users of Gradle Enterprise



TechValidate
by SurveyMonkey

✓ Validated

Published: Mar. 31, 2023 TVID: C42-7D4-678

Source: TechValidate. TVID: [C42-7D4-678](#)



Developer Productivity Engineering (DPE)





Progression of Productivity

1970s+

JIT
Manufacturing

1980s+

Business
Process
Reengineering

1990s+

Change
management

2000s+

Agile, Lean Six
Sigma

2010s+

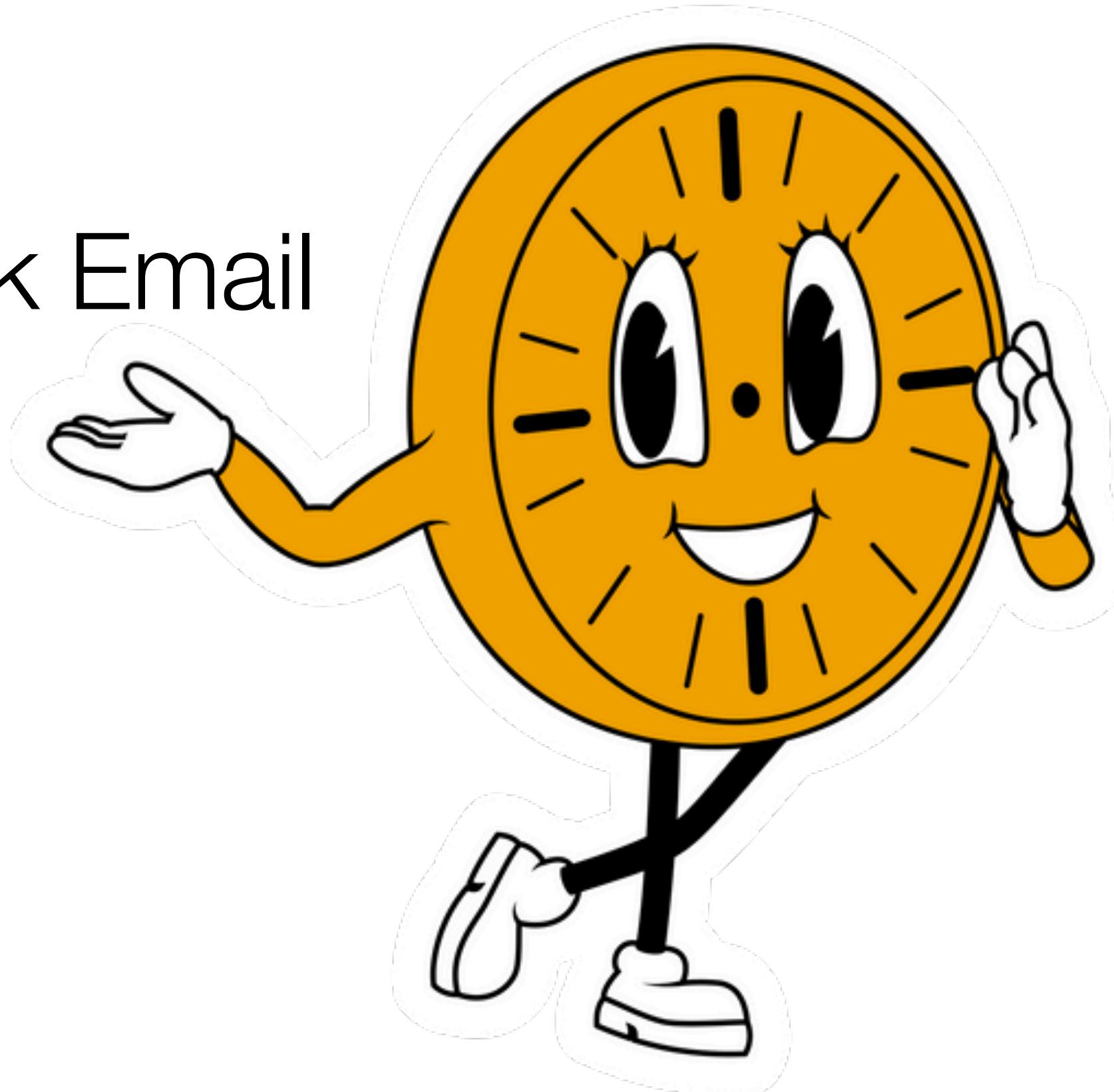
DevOps

2020+

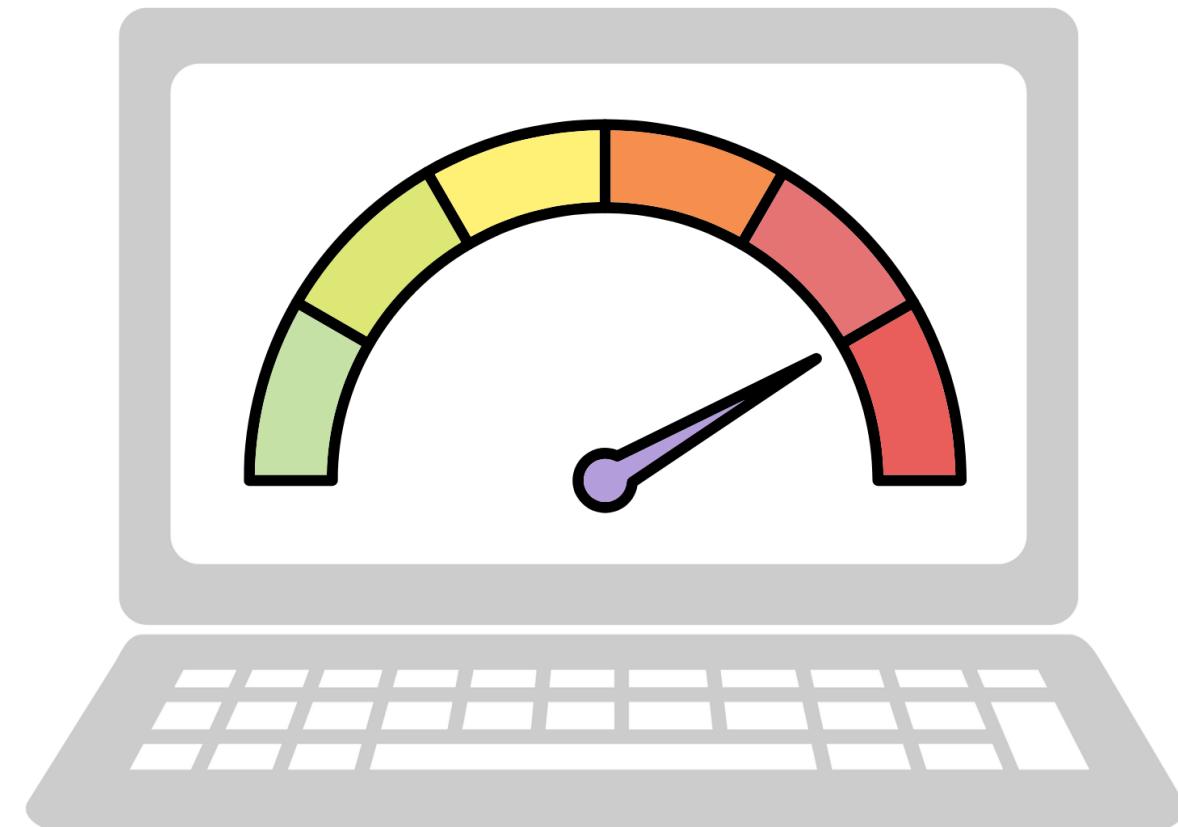
DPE

Slow tests?

Check Email



- Speed up test
- Split up codebase
- Faster laptop



Be Happier Developers!



Image: © wowomnom – stock.adobe.com

Quality of Test Code



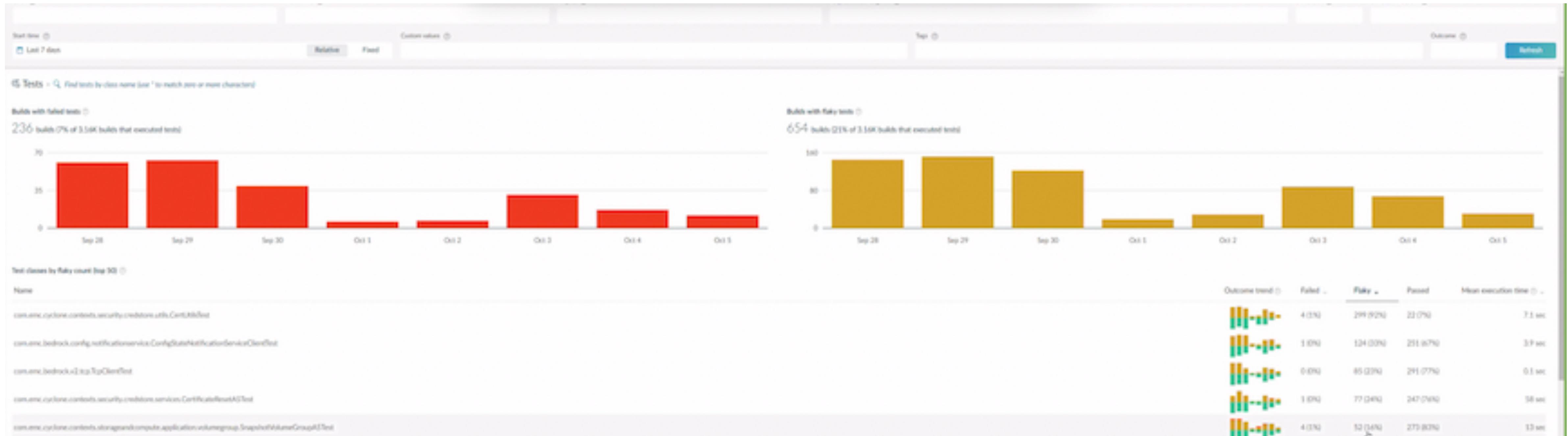
Flaky Tests



The test is flaky. What do you do now?

- a. Try it again
- b. Re-run it
- c. Re-run it again
- d. Ignore it and approve PR
- e. All of the above

Flaky Tests Are Everywhere, Even Dell

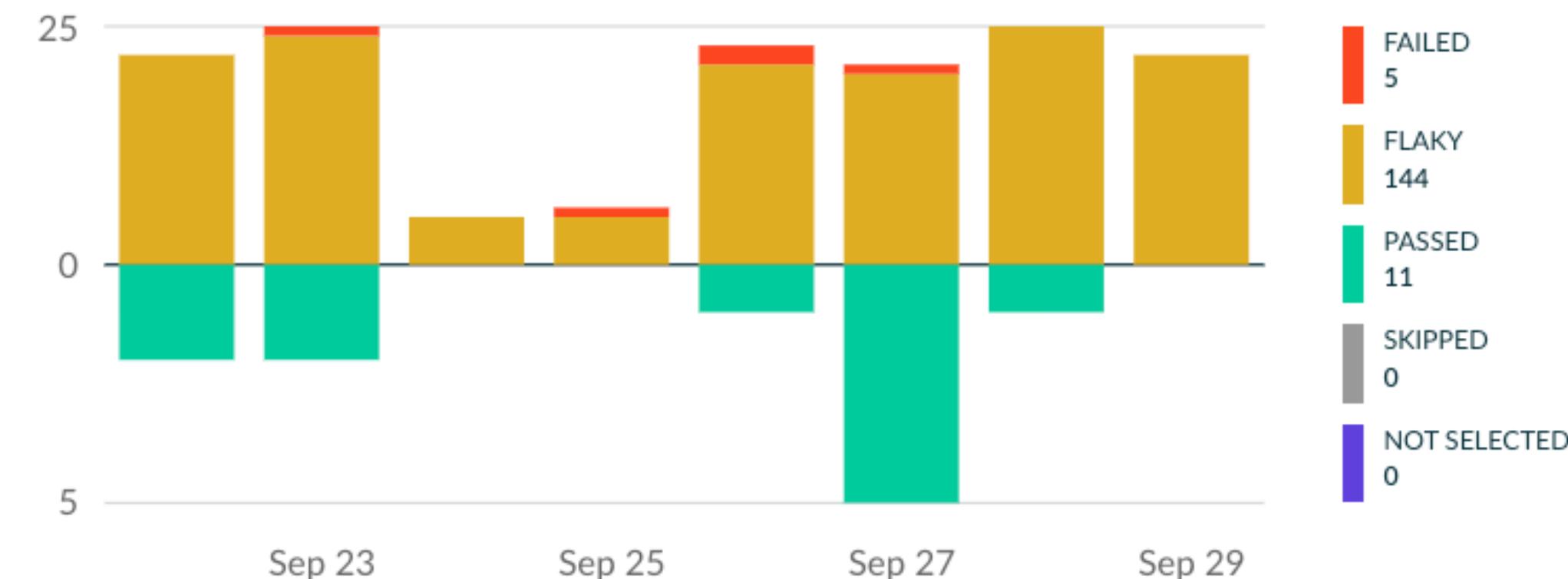


Track and Analyze Flaky Tests

[Tests](#) › org.gradle.smoketests.GradleBuildExternalPluginsValidationSmokeTest [Edit](#) › [Find methods](#)

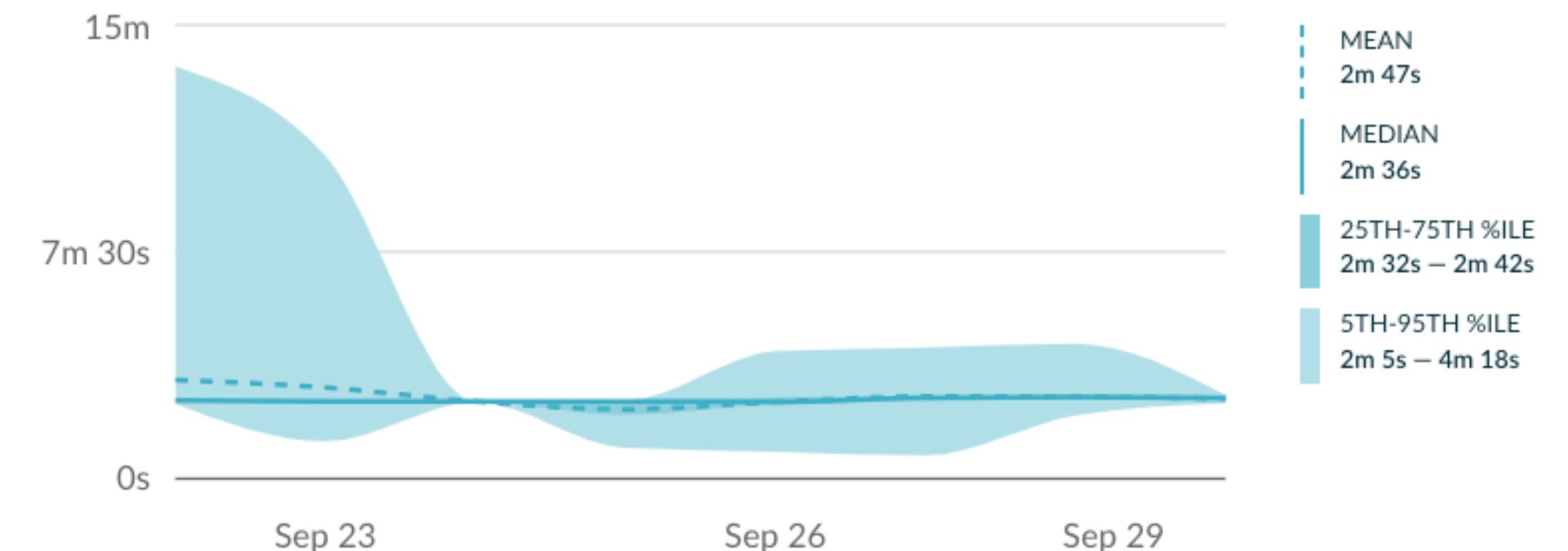
Builds that executed test class [?](#)

160 builds



Mean execution time for test class [?](#)

2 min 47 sec



Tests by flaky count [?](#)

Name	Outcome trend ?	Failed ▼	Flaky ▼	Passed	Mean execution time ▼
performs static validation of plugins used by the Gradle build		5 (3%)	144 (90%)	11 (7%)	2 min 47 sec

Flaky Test Days



blog.gradle.org/how-we-handle-flaky-tests-in-gradle

Functional & Non-Functional Tests

Functional Testing

Tests a user's action and the result as seen by the user.

User Story:

As a **user**, I want to **search** for **my customers**
by their **first** and **last names**.

Non-Functional Tests

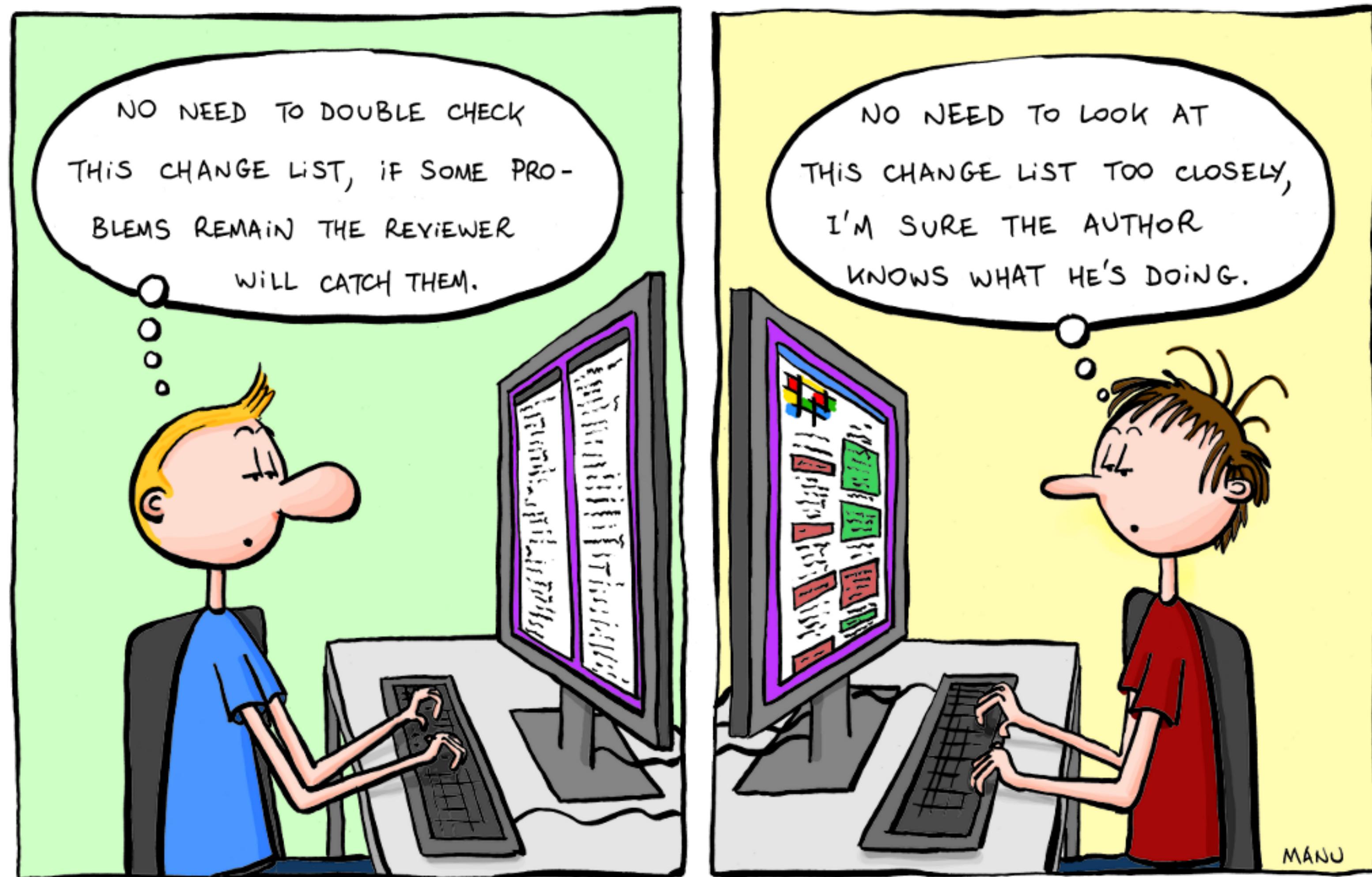
- Performance
- Capacity
- Quality
- Security
- Backup
- Fail-over
- Licensing
- ...

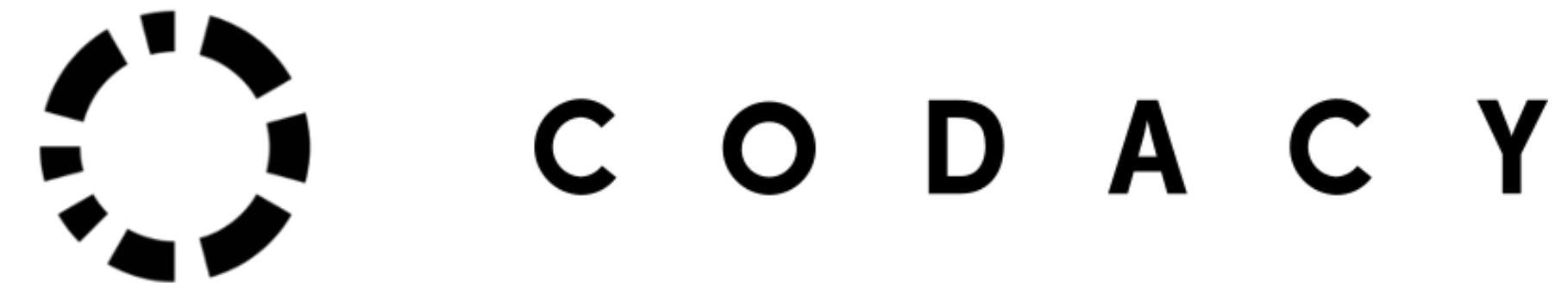
WHEN YOU HEAR THIS:



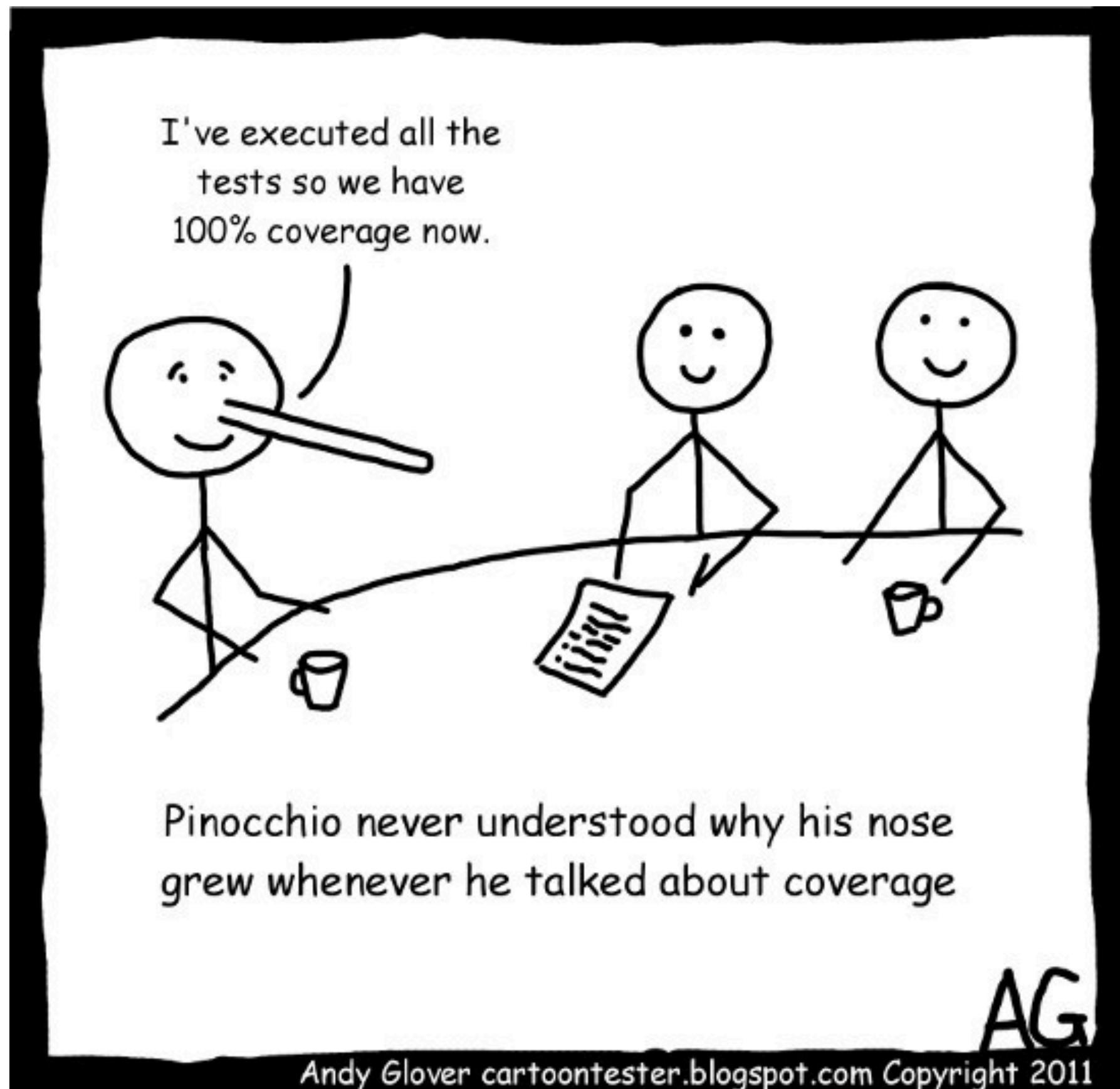
*YOU KNOW YOU'RE IN A
SOFTWARE PROJECT*

Code Quality





Code Coverage Cult



```
public void indoctrinate(User user, Cult cult)
{
    cult.add(user.getName());
}
```

Licensing



Security

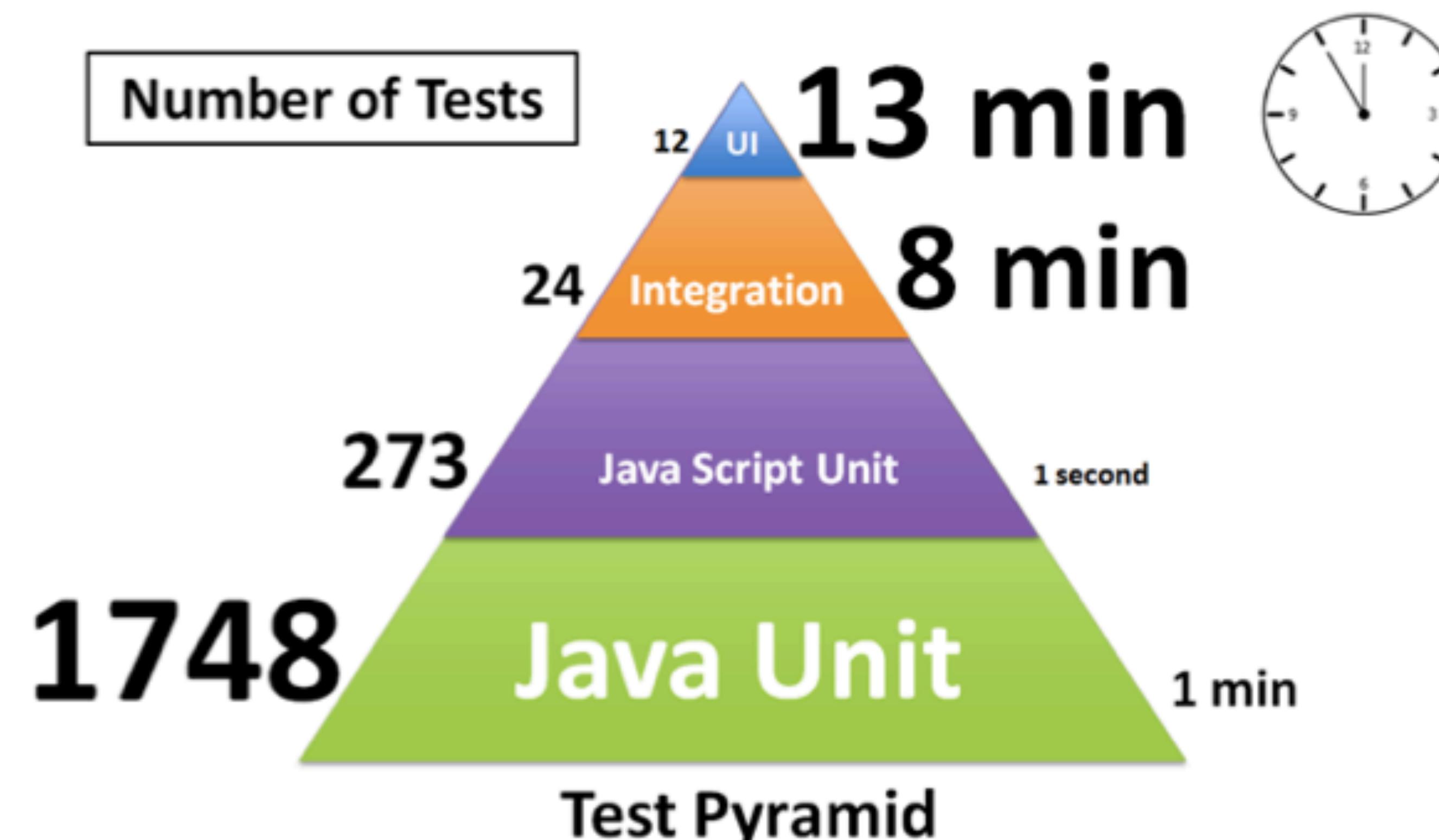
Test security at every level (unit, integration, etc)

Automate application scanning

Be involved with up stream dependencies



What Types of Testing Should I Use?



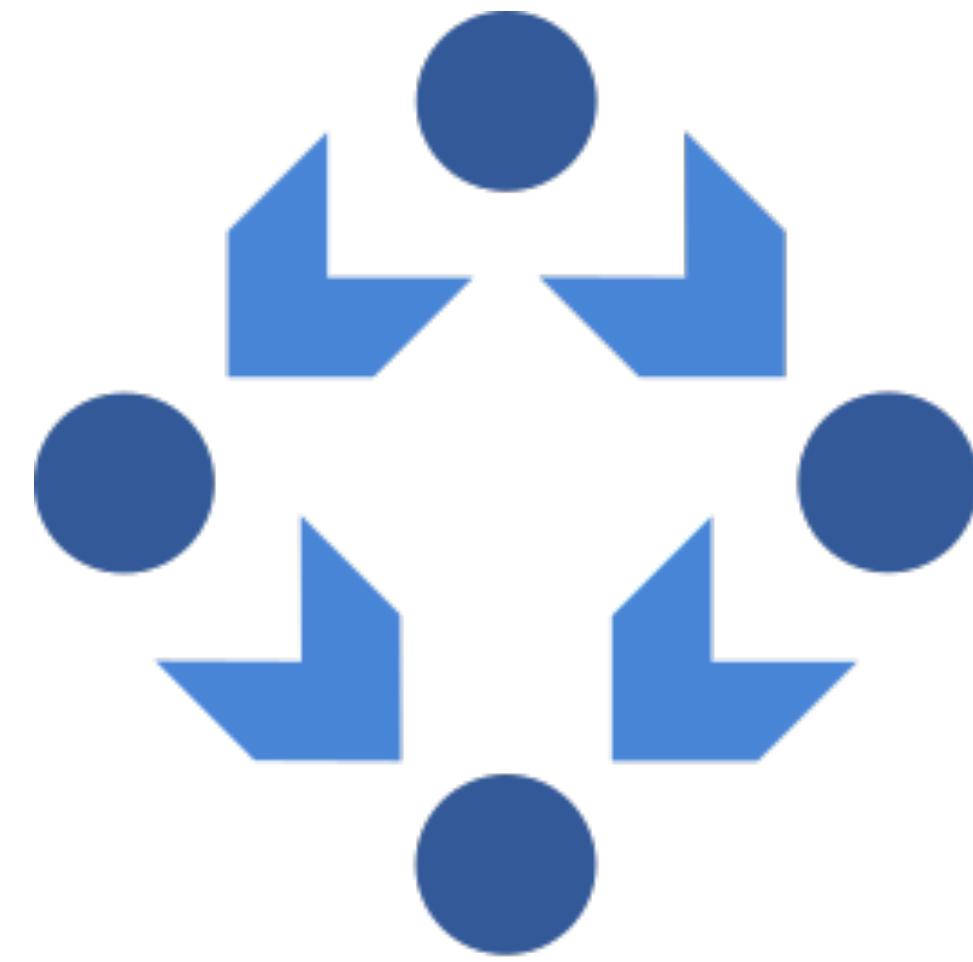
www.fabiopereira.me

ThoughtWorks®

Tips



Cutting tennis
balls in half
lets you store
2 more balls,
saving space



Reproducible Builds



Andres Almiray
@aalmiray



#maven



3:00 AM · Mar 16, 2020

Maven Daemon

```
$ mvnd verify
```

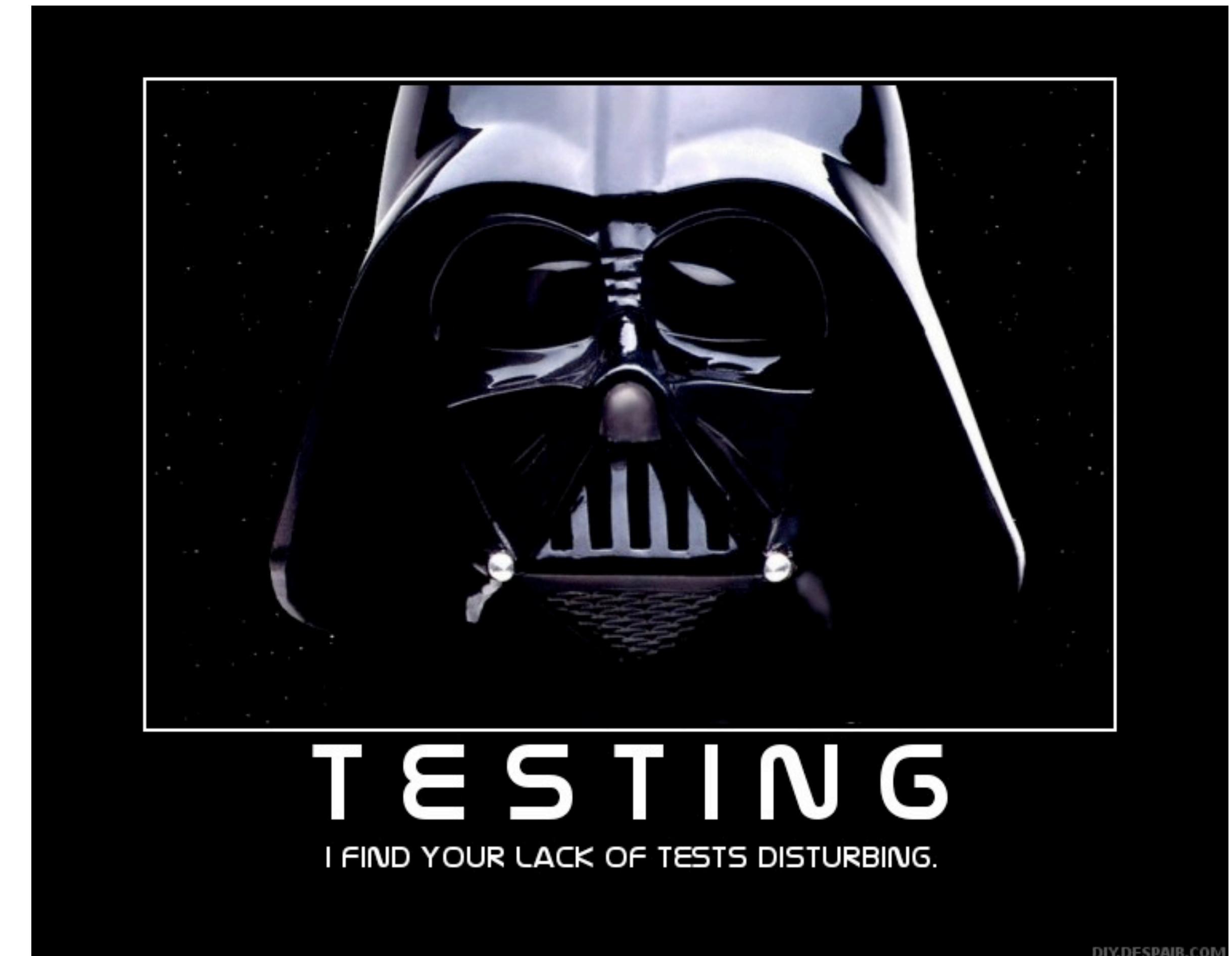
Multithreaded Builds

Build and Test in parallel



Dealing with Legacy Code

Legacy Code -
code without tests



Testing is Confidence



meme-arsenal.ru

Questions?



DPE Book



Slides