# Non-deterministic Tests

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Known in the business (and hereby referred to) as flaky tests

# What is a flaky test?

A test which could pass or fail for the same configuration.

# Why do flaky tests occur?

Because we rely on non-deterministic or undefined behaviors.

# Common reasons

- Asynchronicity
- Concurrency
- Dependencies
- Resource-management
- Time

# Less common reasons

- Infrastructure
- Random
- Floats
- Unordered collections

# Why are they an issue?

- Slows down CI
- Reduces confidence in test suite
- Is time-consuming

# How to deal with flaky tests

The good way

- Quarantine
- Document
- Analyse
- Fix the issue

# Detecting flaky tests

# Rerun

**PROS**

- Simple

**CONS**

- Inaccurate
- High overhead for large test suites
- Not very researched

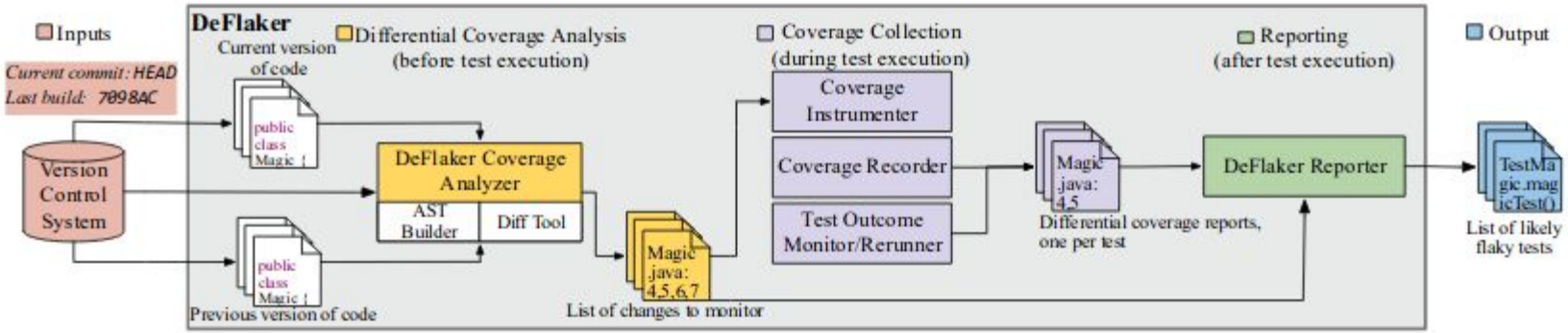
# DeFlaker

## PROS

- Accurate
- Scalable
- Finds flaky tests on first run

## CONS

- Complex
- May be hard to implement
- High overhead for small projects
- Not very researched


Inputs
Current commit: HEAD
Last build: 7098AC
Version Control System
DeFlaker
Current version of code
public class Magic {
Differential Coverage Analysis (before test execution)
DeFlaker Coverage Analyzer
AST Builder
Diff Tool
public class Magic {
Previous version of code
Magic .java: 4,5,6,7
List of changes to monitor
Coverage Collection (during test execution)
Coverage Instrumenter
Coverage Recorder
Test Outcome Monitor/Rerunner
Magic .java: 4,5
Differential coverage reports, one per test
Reporting (after test execution)
DeFlaker Reporter
Output
TestMagic.magicTest()
List of likely flaky tests

# DeFlaker

# Summary

- Don’t use sleep for async tests, use callback or polling
- Isolate tests
- Use proper cleanup and setup policies
- Don’t use system time
- Rerun is good for small projects, DeFlaker may be better for larger ones

# Summary (cont.)

- Detect, Quarantine, Document, Analyse, Fix
- Use the proper tool for detection
- Quarantine flaky tests to keep test suite healthy
- Document relevant data about the flaky test
- Find root cause, bug or flakiness?
- Fix it as soon as possible