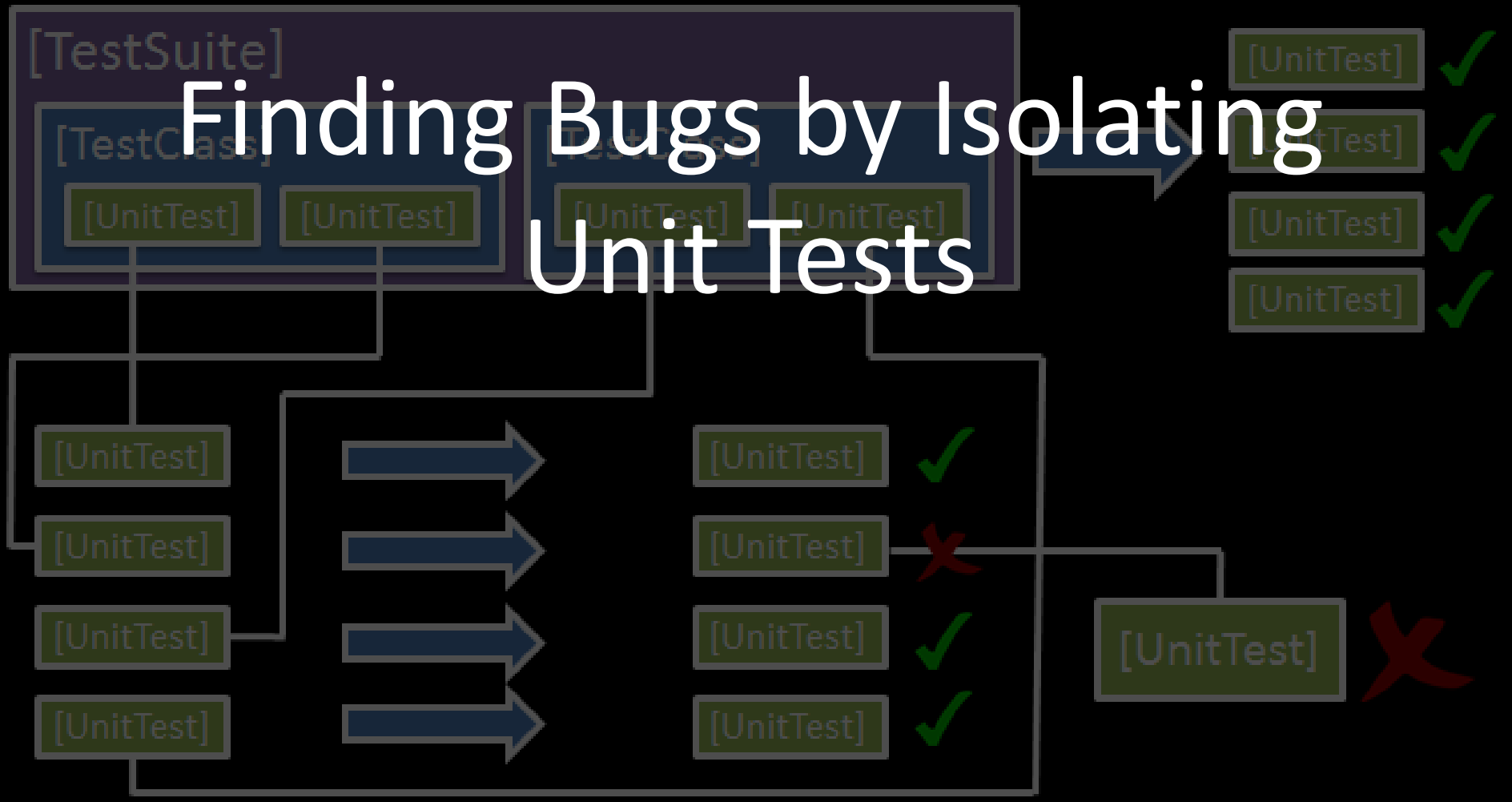
Finding Bugs by Isolating Unit Tests



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University of Washington, Computer Science & Engineering

Independence Assumption

- Unit tests are assumed to be independent
  - Test frameworks (e.g., JUnit)
  - Test selection and test prioritization

"For the most part we just ***assumed*** that test cases would be ***independent***, but we didn't think to make that ***explicit***. "

Michal Young
Author of *Software Testing and Analysis: Process, Principles, and Techniques*

Example (Apache Commons CLI)

Code

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public class OptB {
   private static String name;

   public static Option create() {
      Option result = new Option();
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   }
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      Option result = new Option(name);
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   }
   private static void clear() { name = "arg"; }
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*OptB = OptionBuilder

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public void testOption() {
   Option opt = OptB.create();
   // Test some property of opt.
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public void testOptionWithArg() {
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   assertEquals(opt.getName(), "arg")
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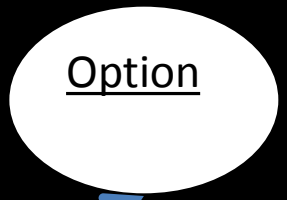

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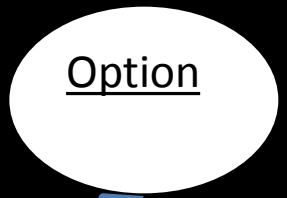

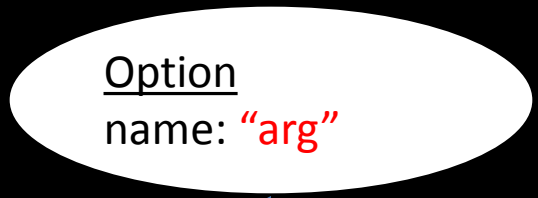

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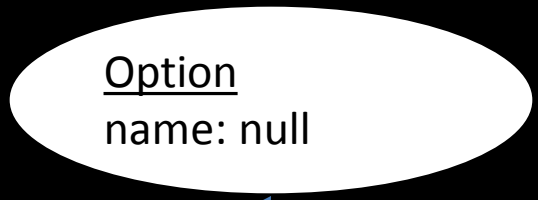

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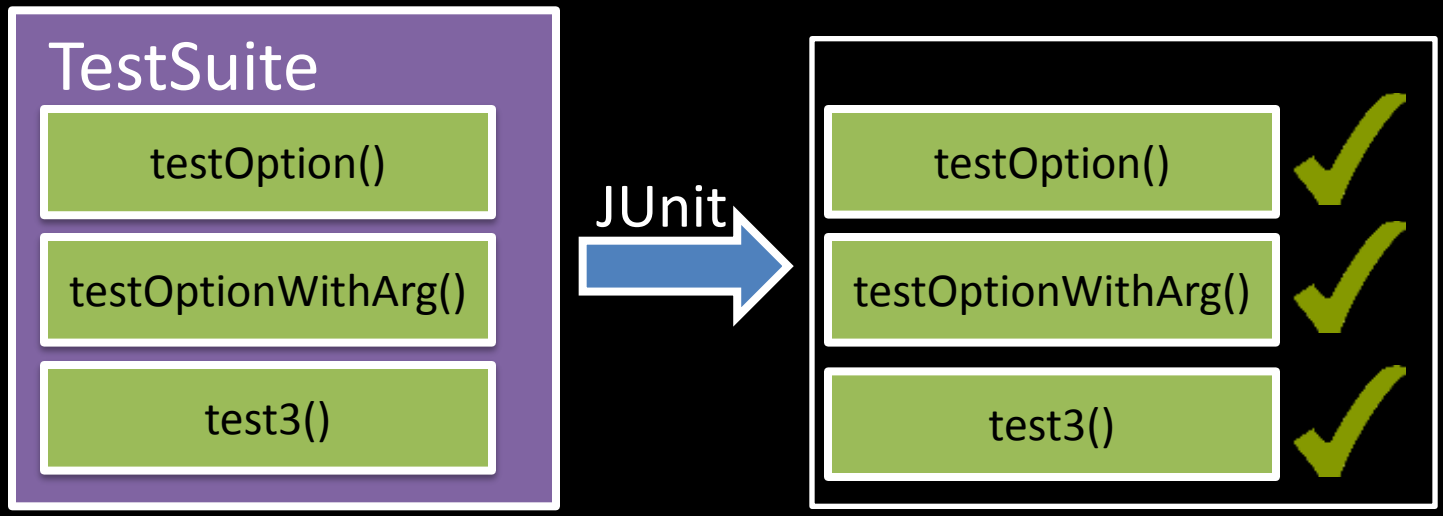

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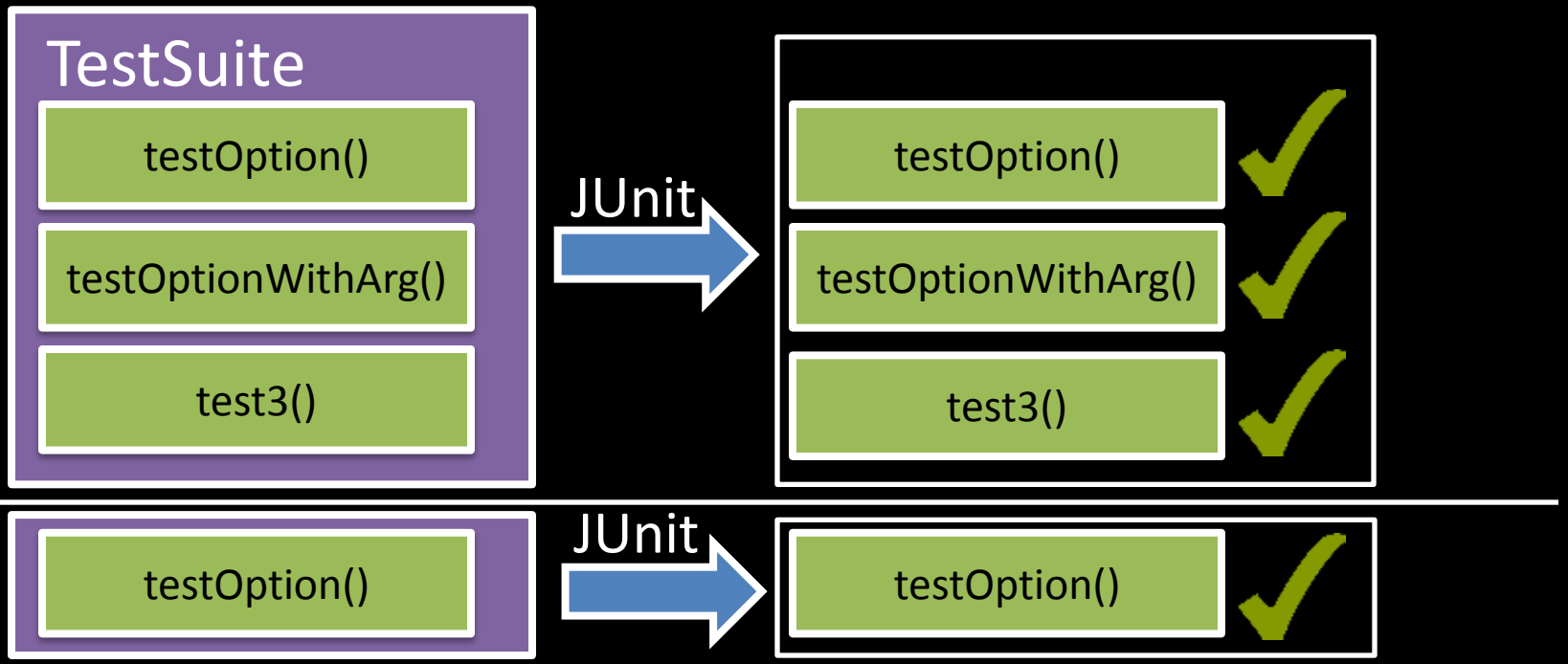

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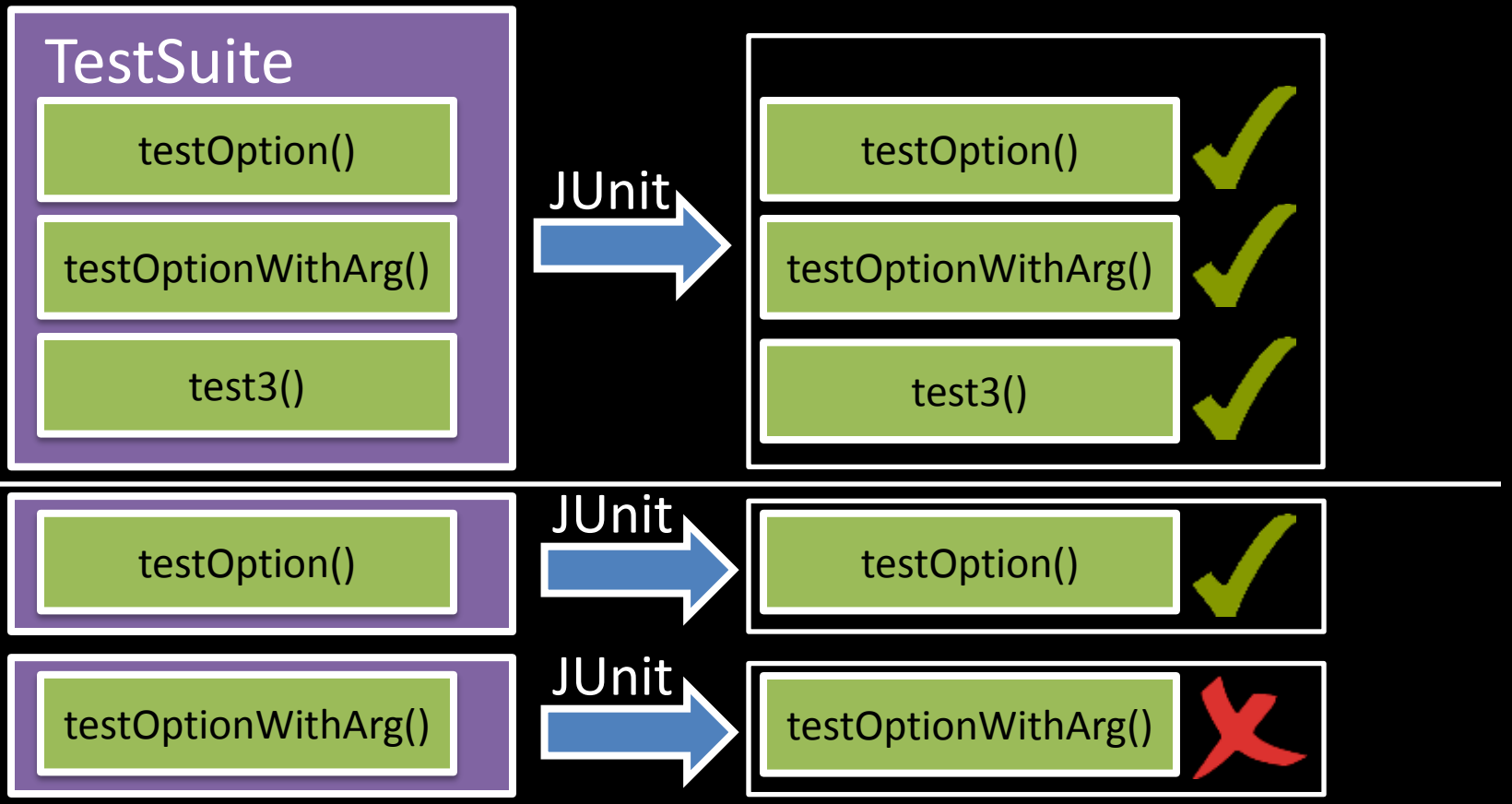

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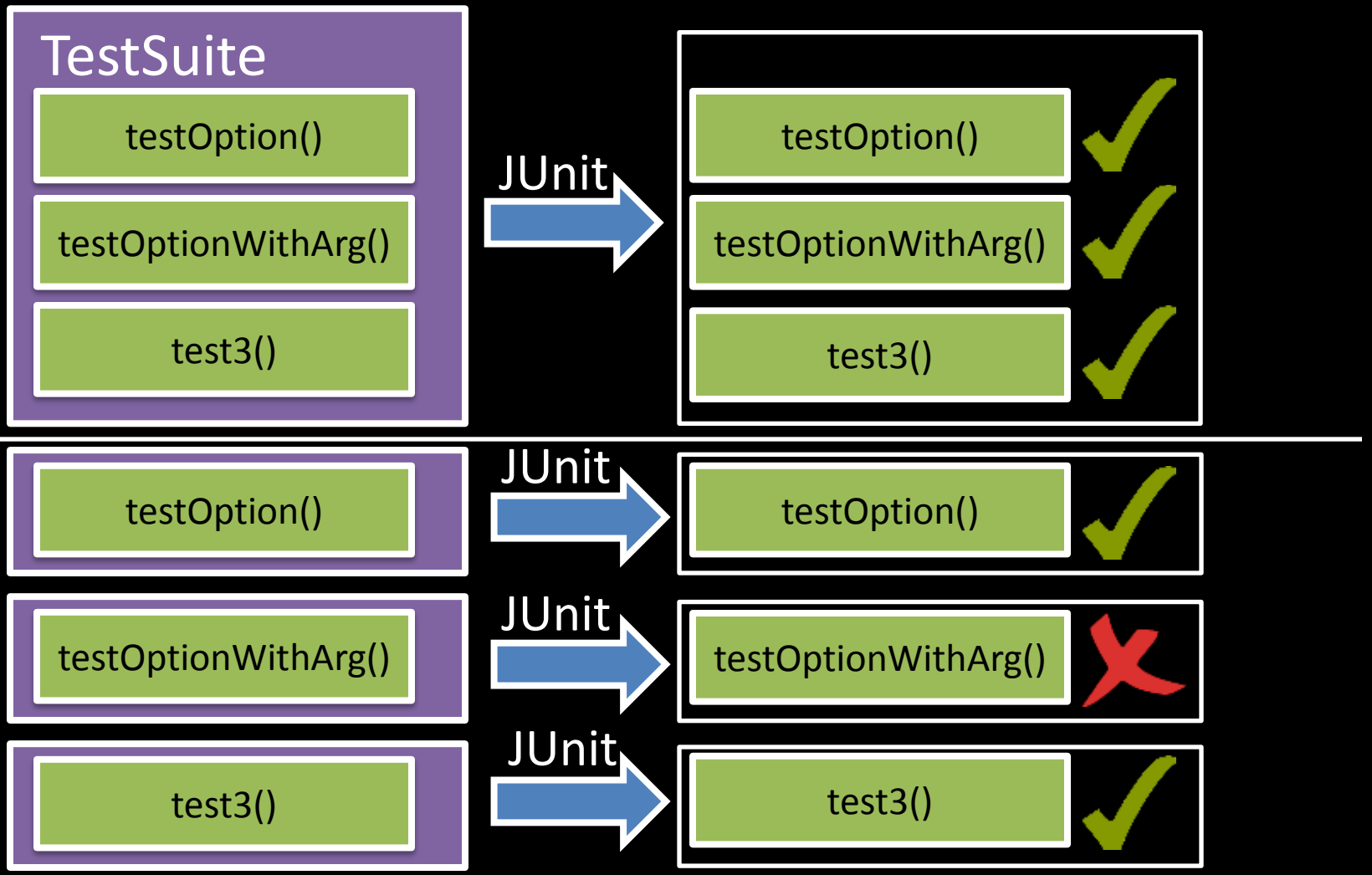
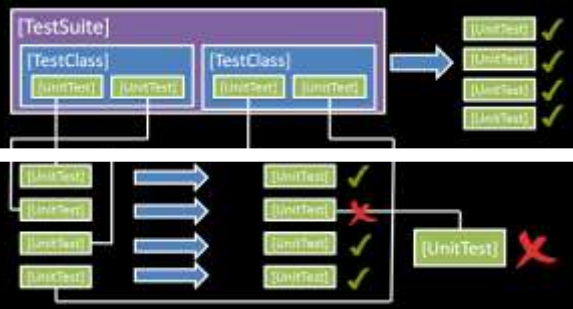


Preliminary Results

153 Revisions

commons CLI

Test Isolator



3 Failing Tests

test27635 test13666

testOptionWithout ShortFormat2

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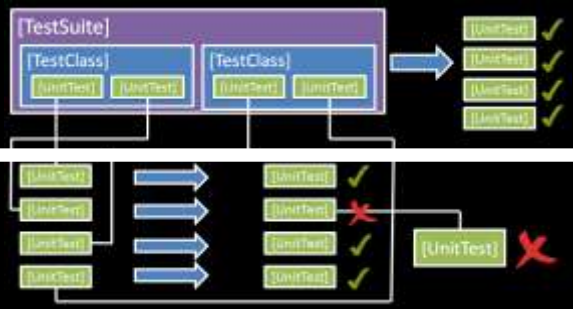

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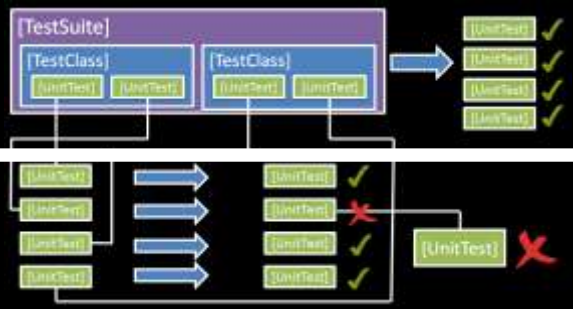

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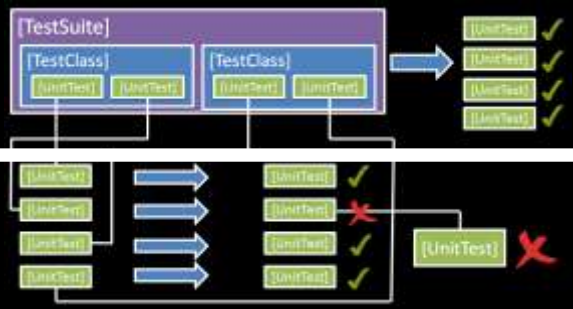

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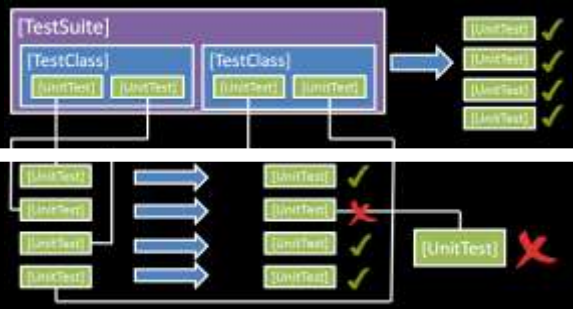

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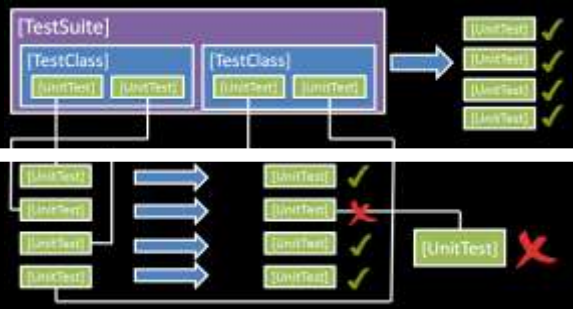

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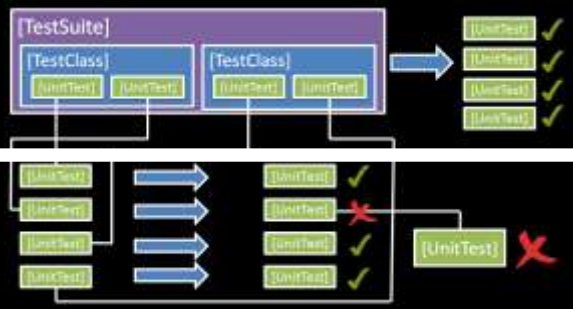

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120 Revisions
3 Changes to
OptionBuilder.java

Related Work

- Independence between unit tests is widely assumed
- Problem is noted by other work on testing

  [Robinson2011]

Future Work

- Analyzing more OSS projects
- Characterizing data dependency types
- Pinpointing the location of the dependency
- Extending the existing testing frameworks to support running tests in isolation

Contributions

- Counterexample to the independence assumption
  - Real system
  - Real cost
  - Easy to confirm
- Adds incentive to testing R&D to reconsider independence assumption