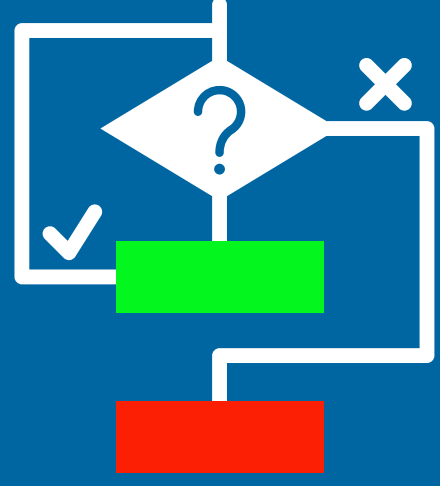


Developer-Centric Test Amplification

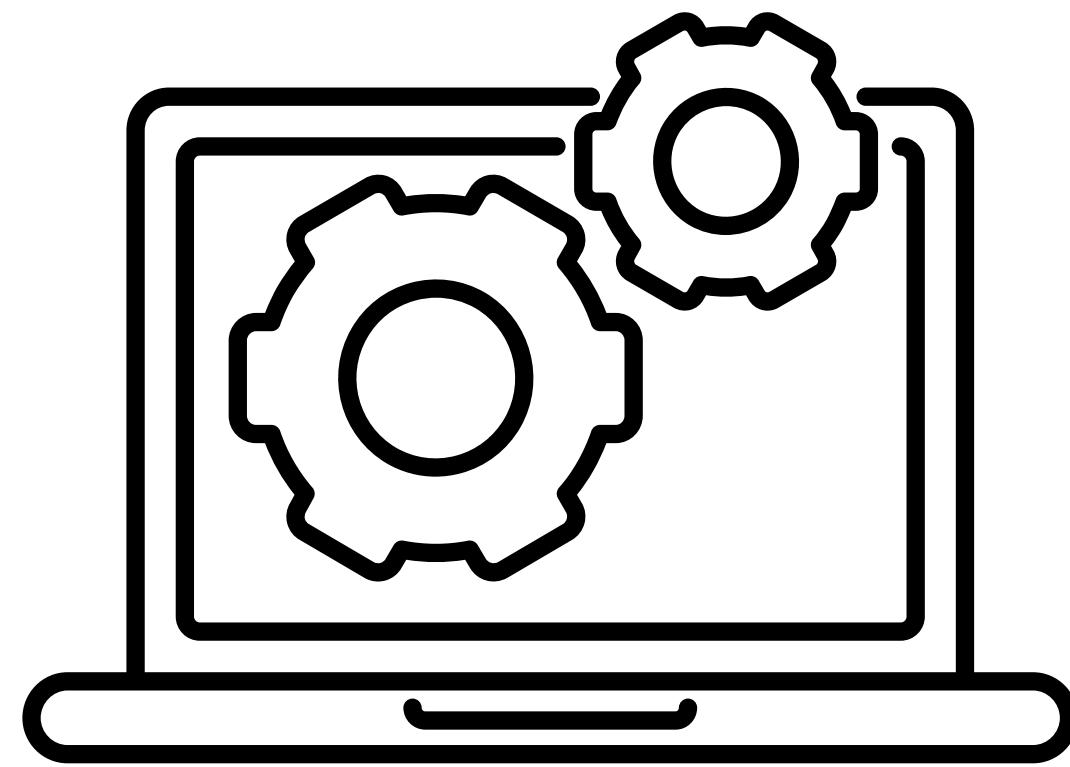
Developer Testing

Programmers writing scripts to check that the code they write behaves as they expect.



- tedious, keeps from progressing
- little direct value
- ⇒ Many test less than they want to

Test Generation



- Challenges:
- Readability / Understandability
 - Limited Attention / Motivation

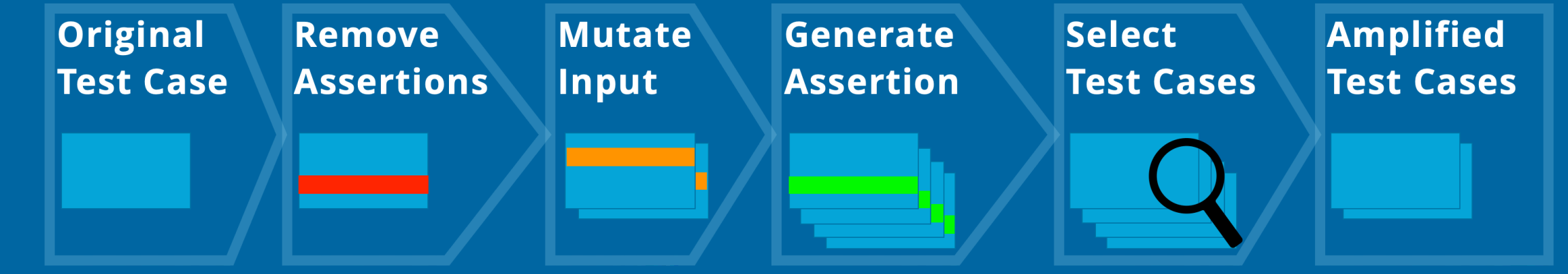
For and With

- Chances: Tackle the hard aspects of test generation
- Oracle Problem
 - Prioritization

Test Amplification

- Generate new tests...
- based on existing tests
 - that improve the test suite

```
@Test public void html() {
    Attribute attr = new Attribute("key", "value &");
    assertEquals("key=\"value &amp;\"", attr.html());
}
```



```
@Test public void html_nbsp() {
    Attribute attr = new Attribute("key", "Hello\nthere$NBSP$");
    assertEquals("key=\"Hello\nthere&nbsp;\"", attr.html());
}
```

Amplified test 'html_nbsp'
This test improves coverage in these classes/methods/lines:
`org.jsoup.nodes.Entities:`
`escape`
L. 197 +3 instr.
L. 198 +5 instr.

Interaction is Central

We have to generate powerful, high-quality tests, but it is crucial to convey this power and quality to the developer to convince them to include the tests.

Communicate Impact on Test Suite Quality

TestImpactGraph



Impact Descriptions

This test checks that equals() returns false for an Attribute and null.
This test checks that addElement() throws an IllegalArgumentException if the given element is null.

Developer-Involvement

Direct Amplification

Generate a test for this branch

Information to Start Amplifying

Can you give us an example on how you would initialize Node?
`Node node = new Node("?");`

Edits to Amplified Tests

`assertEquals("What should come out here?", attr.html());`

Vision: Automatic & Integrated Test Recommendation

Developer-Driven Test Adequacy Criteria

Project- & Developer-Adapted Generation

Hey! 😊 We generated a new test for you that checks that your new method process() returns null if null is passed.
[Inspect new test](#) [Include new test](#) [This is not important to test](#)

