

# Reproducible Wrapper for API Migration

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# Motivation

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# Method

## Aim:

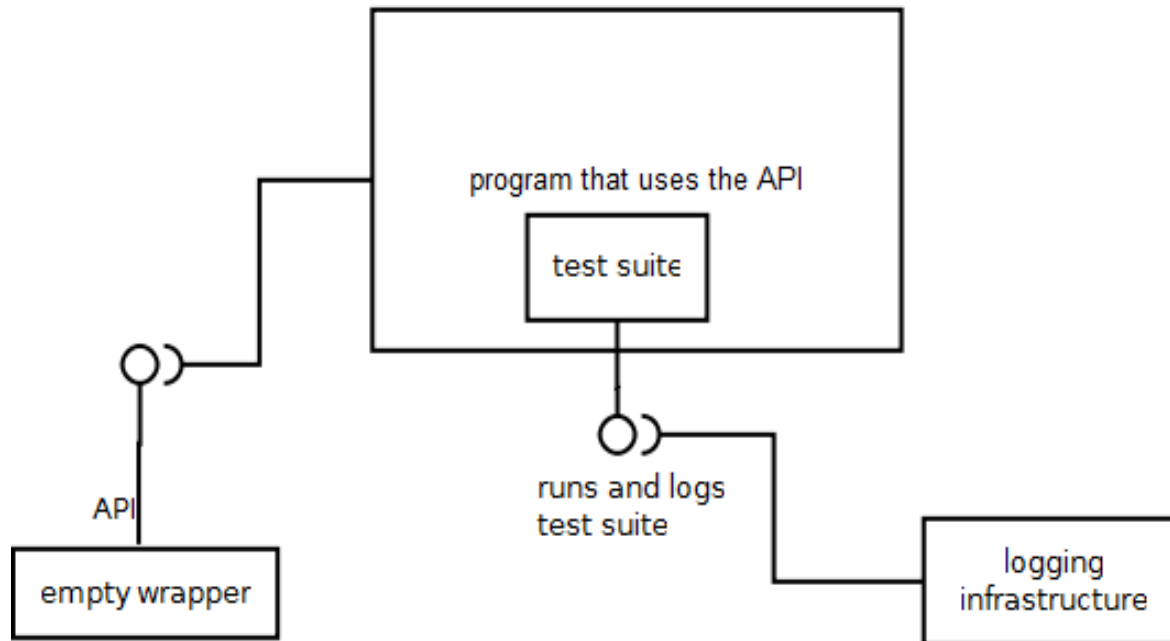
- don't implement the whole API
- make it reproducible

# Method

## Five Steps:

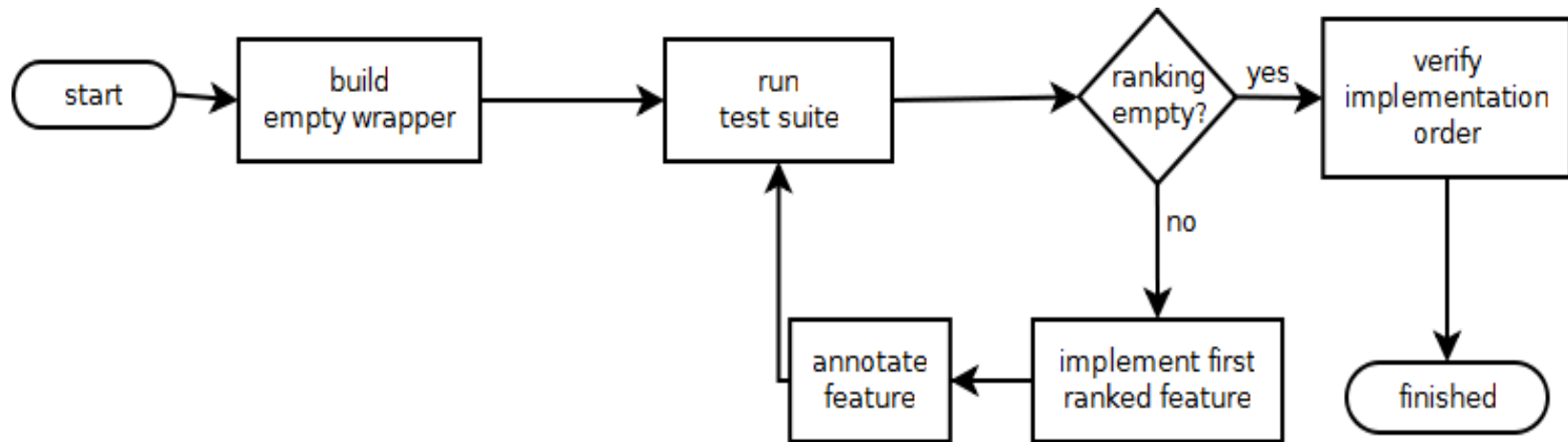
1. use a program....
2. ...with a test suite
3. develop empty wrapper
4. build infrastructure
5. prove correctness

# Method



component diagram of the infrastructure

# Method



flow chart of the implementing algorithm

# Infrastructure

## Languages and Tools:

- Java
- JUnit
- Ant
- AspectJ



# Infrastructure

## Ranking and Verification:

- Ranking

`@Ranking(position=<value>)`

- Verification

- store each implemented method in a list
- use a pointcut to switch off methods

## Case Study

- XML pair: XOM and DOM
- used project: Chemistry Development Kit (CDK)

## Case Study

### Development Process:

- empty wrapper:

nu.xom.Builder() > count: 1412 | successes: 556 | failures : 24 | errors : 832

- next iteration:

Document nu.xom.Builder.build(Reader) > count: 703 | successes: 278 | failures: 12 | errors : 413

nu.xom.ParentNode() > count: 706 | successes: 278 | failures: 12 | errors : 416

Document nu.xom.Builder.build(InputStream) > count: 3 | successes: 0 | failures : 0 | errors : 3

nu.xom.Node() > count: 706 | successes: 278 | failures : 12 | errors : 416

# Case Study

- **Reimplementations:**

XOM Type	DOM Type	#reimplemented XOM methods
nu.xom.Attribute	org.w3c.dom.Attr	1/20
nu.xom.Builder	javax.xml.parsers.DocumentBuilder	3/15
nu.xom.Document	org.w3c.dom.Document	1/15
nu.xom.Element	org.w3c.dom.Element	12/38
nu.xom.Elements		2/2
nu.xom.Text	org.w3c.dom.Text	0/9

# Case Study

## Differences:

- constructor-based vs. factory-based

XOM:

```
Builder builder = new Builder();
```

DOM:

```
factory = javax.xml.parsers.DocumentBuilderFactory.newInstance();  
DocumentBuilder = factory.newDocumentbuilder();
```

# Case Study

## Differences:

- different parameters

XOM:

getNamespaceURI() returns empty string

DOM:

getNamespaceURI() returns „null“

**Questions?**

# Resources

- [1] Thiago Tonelli Bartolomei, Krzysztof Czarnecki, Ralf Lämmel, and Tijs van der Storm. Study of an API migration for two XML APIs. In Postproceedings of Software Language Engineering (SLE 2009), LNCS. Springer, 2010.
- [2] Thiago Tonelli, Krzysztof Czarnecki, and Ralf Lämmel. Swing to SWT and back: Patterns for API migration by wrapping. In 26th IEEE International Conference on Software Maintenance (ICSM 2010), September 12-18, 2010, Timisoara, Romania, pages 1–10. IEEE Computer Society, 2010.
- [3] Chemistry Development Kit, [cdk.sourceforge.net/](http://cdk.sourceforge.net/)