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Unit Tests and Component Tests do Make a Difference on Fault Localisation Effectiveness

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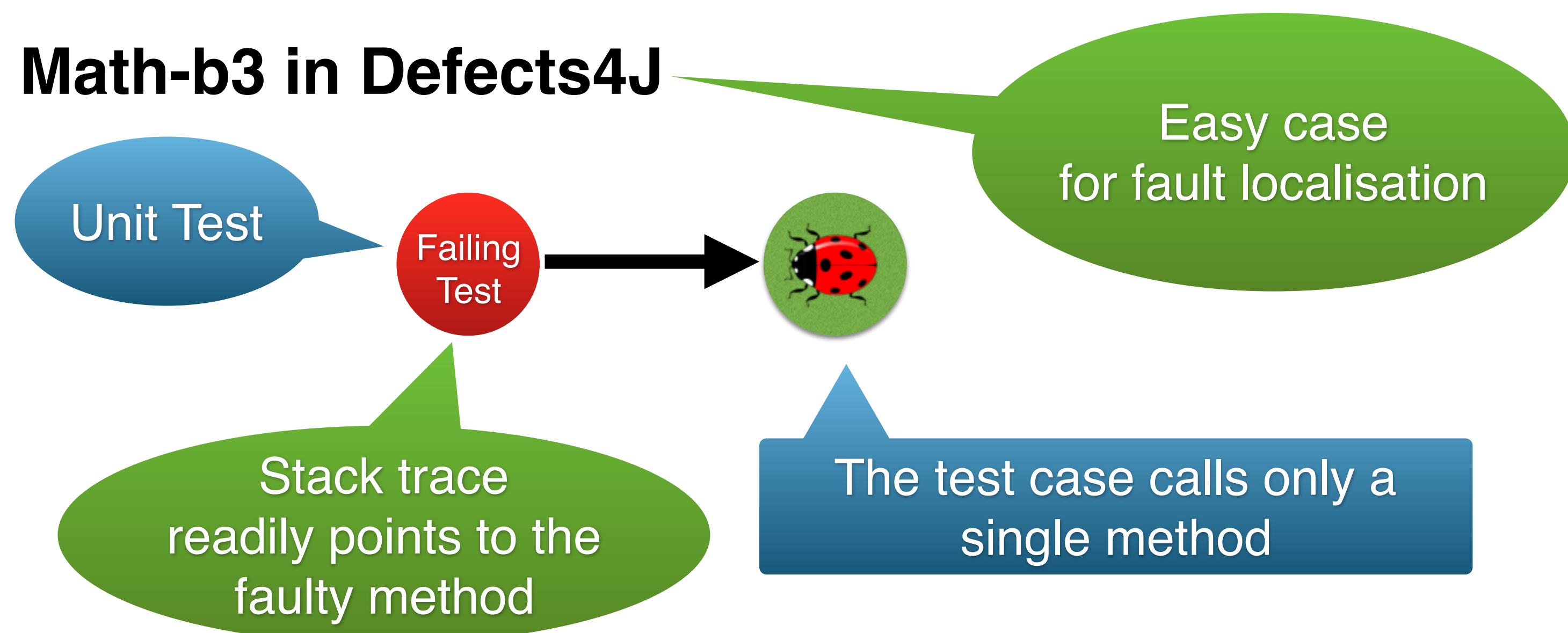
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Highlights

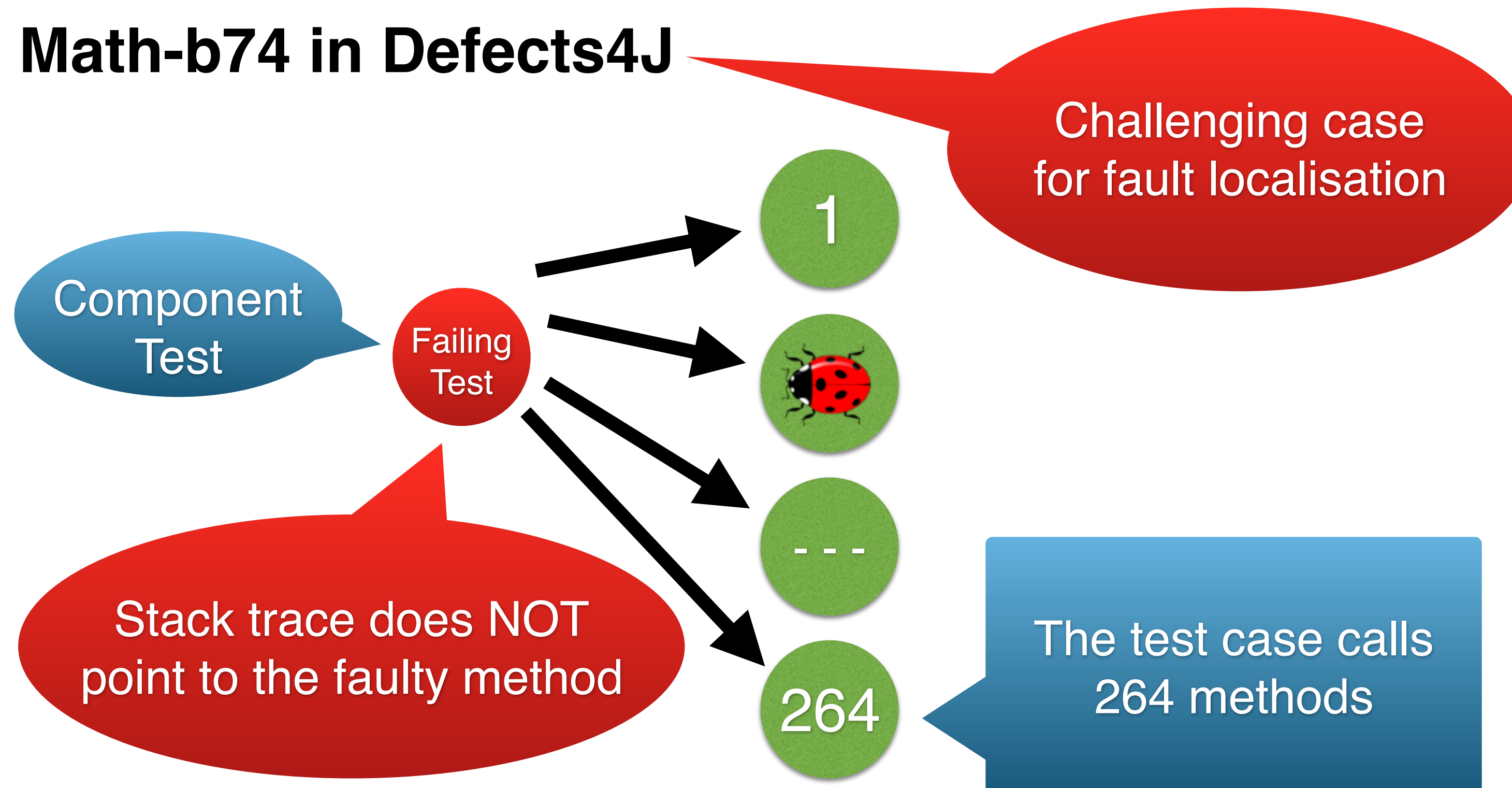
- There is a big **difference in the performance** of spectrum based fault localisation techniques when **facing unit tests and component tests**.
- The faults exposed by **unit tests** represent **easy cases**.
- While, the faults exposed by **component tests** represent **challenging cases**.
- Thus, researchers should **distinguish between easy and difficult to locate faults** when evaluating new fault localisation techniques.

Motivating Example

Math-b3 in Defects4J



Math-b74 in Defects4J



Case Study Setup

Fault Localisation Techniques

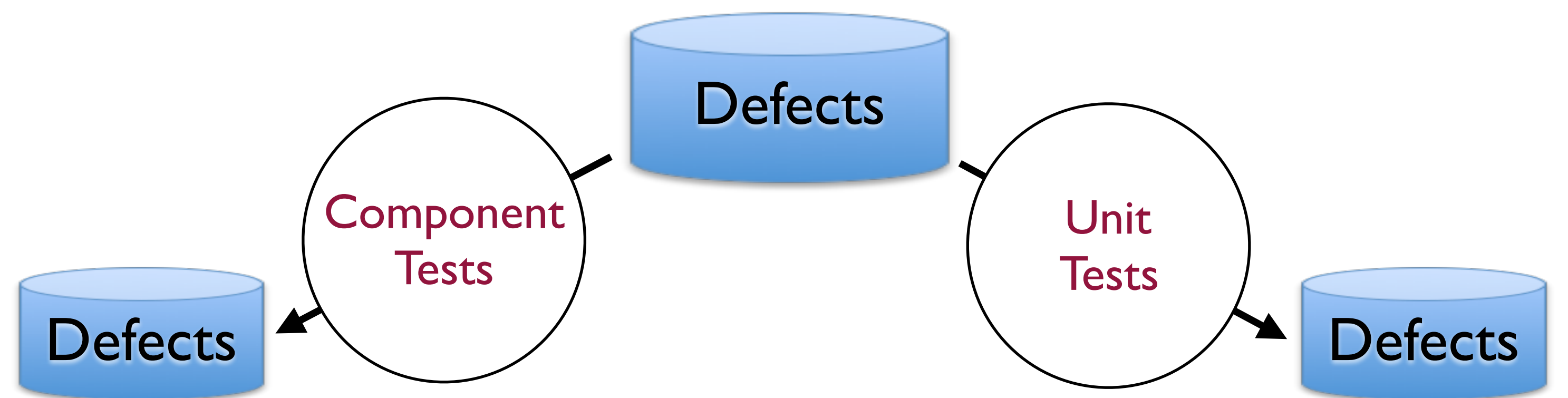
- We compare the performance of 2 families of spectrum based fault localisation on the defects exposed by unit tests and component tests.
- The **Basic family (B)**—the standard implementation and the **Extended family (E)**—a recent improvement using frequent itemset mining.
- Each family is parameterised with **8 best performing fault locators** as known today, thus resulting in 16 different spectrum based fault localisation heuristics.

Evaluation metrics

- $acc@n$ ($n \in \{1, 3, 5\}$)
- mean average precision (MAP).
- mean wasted effort (MWE).

Dataset

- We use **Defects4J** dataset and **separate faults into 2 categories** (exposed by unit and component tests).

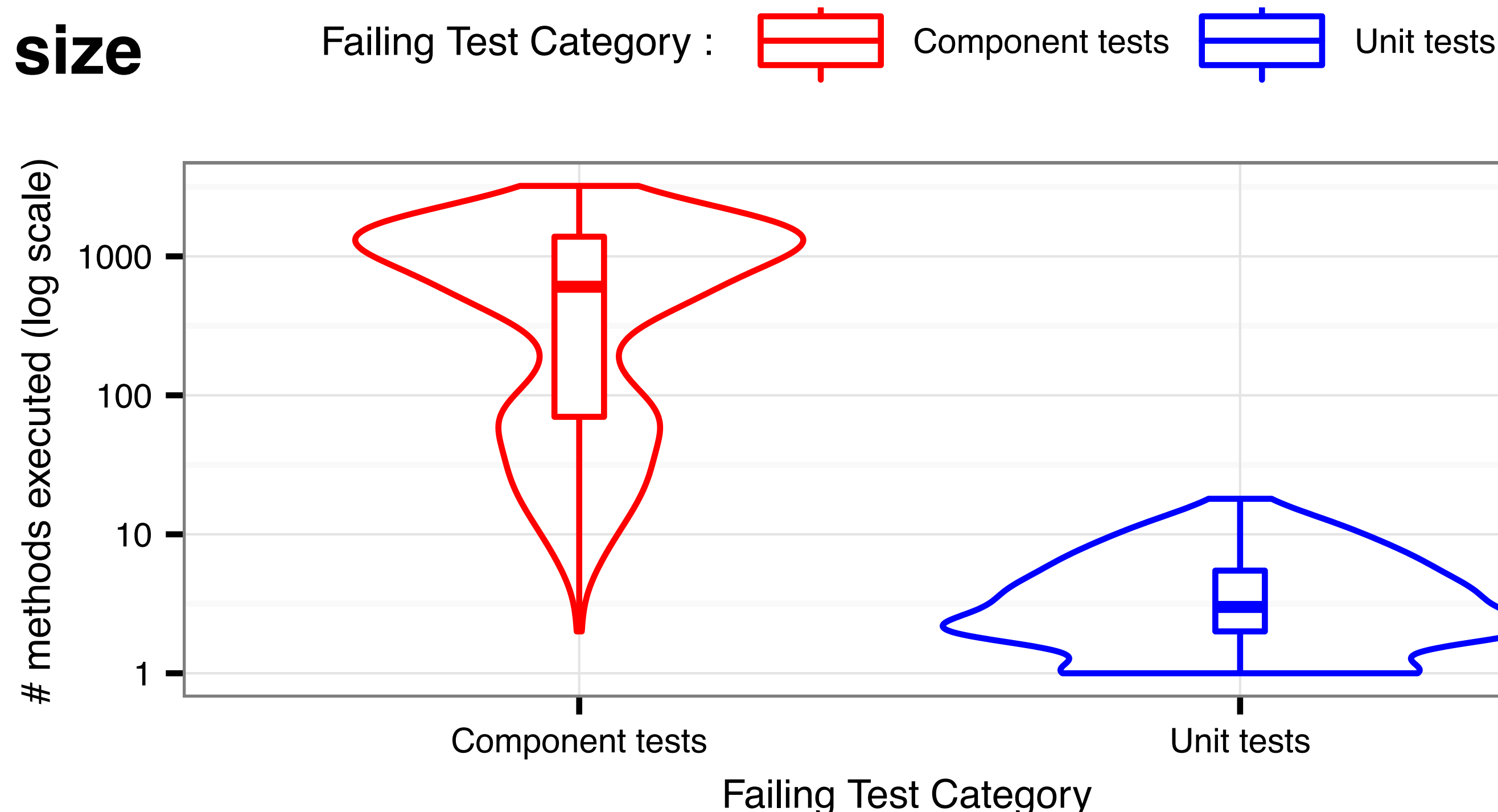


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Results

•Search Space size



•Comparisons of the 2 Families

Family	Fault Type	acc@1	acc@3	acc@5	MAP	MWE
E	UT	45	58	64	0.7021061	3.85
	CT	53	95	123	0.2851449	39.44
B	UT	35	61	67	0.6440786	2.44
	CT	30	65	80	0.1913367	120.58

48% (E-CT)

11% (B-CT)

45 / 73 = 62%

53 / 273 = 19%