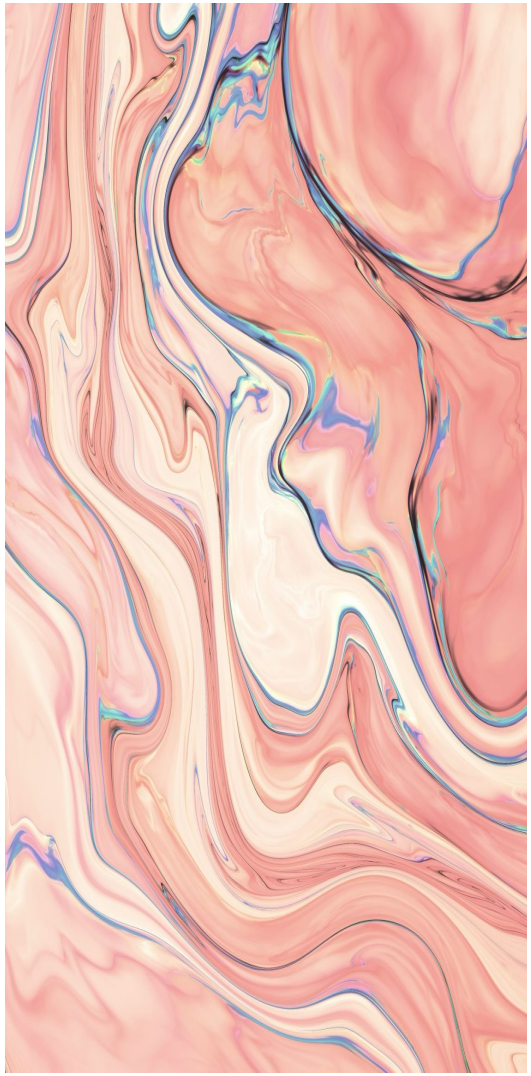

Do Fault Localization Techniques work on REST APIs?

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Introduction

- Fault Localization (FL):
  - FL is an essential part in software engineering for identifying the locations of faults (or bugs) in the software code.
  - Some FL Techniques: Spectrum Based FL, Slice-Based FL, Mutation-Based FL

  - Evaluation of these Techniques:
    - Specific Dataset (REST API applications – using Spring Boot or Jersey)
    - Effectiveness: Precision, Recall, F-Measure, Accuracy
    - Efficiency: Computation Time

Problem Statement

Problem Statement:

While Fault Localization Techniques are pivotal in reducing the debugging time, their effectiveness for REST APIs, remains unexplored.

Notion:

Assessing the efficacy of fault localization (FL) techniques on REST APIs, guided by an established fault taxonomy [1] and dataset, to reveal the capabilities and limitations of these methods in this specialized context

[1] Bogdan Marculescu, Man Zhang, and Andrea Arcuri. 2022. On the Faults Found in REST APIs by Automated Test Generation. ACM Trans. Softw. Eng. Methodol. 31, 3, Article 41 (March 2022), 43 pages. https://doi.org/10.1145/3491038

Research Questions

RQ1: Do fault localization techniques effectively localize faults in REST APIS?

RQ2: What categories of faults are most effectively localized by current techniques?

RQ3: Which fault localization techniques offer the highest accuracy and precision in the context of REST APIs?

Key Idea

RQ: Do Fault Localization techniques effectively localize faults in REST APIs?

Idea:

- Utilize the existing taxonomy of faults and a dataset of faults from REST APIs
- Apply various established fault localization techniques to each simulated fault
- Compare the localization results with the known outcomes to evaluate accuracy and precision
- Analyze which categories of faults (based on taxonomy) are most effectively localized, focusing on the traits of faults that successfully identified vs which are not which are not identified.

Evaluation Plan

1. **Test Execution:** Apply selected fault localization techniques to REST API faults, recording successes and failures.
2. **Results Analysis:** Compare technique outputs against taxonomy-grounded truth to assess accuracy and effectiveness.
3. **Conclusions Drawn:** Analyze and report on which fault types are effectively localized and identify technique strengths and limitations.