Project Plan Report

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1. What problem(s) are you solving? This should also include motivation for why this question is worth answering.

- **Research Question 1:** To what extent does modifying API specifications, including variable types and paths, impact AGORA's ability to generate accurate and relevant test oracles for REST APIs?

❖ Motivation – The motivation behind this is to help developers with insights that enable them to strategically modify their APIs to produce better test oracles.

❖ This research is driven by the need to understand the resilience of automated testing tools, specifically AGORA, against the dynamic nature of REST API development. As APIs evolve, developers frequently adjust structures, including paths and data types, to meet new business requirements or enhance functionality. This study aims to illuminate whether such changes compromise the integrity and applicability of generated test oracles. Identifying whether adherence to specific structural patterns enhances the generation of test oracles will equip developers with insights to balance between API evolution and the maintenance of high-quality, reliable automated testing processes.

- **Research Question 2:** How do changes in black-box test case generators, specifically transitioning from RESTest to alternative tools such as RESTler and RESTTestGen affect the patterns and quality of invariants detected in REST API testing?

❖ Motivation - This research is motivated by the need to critically evaluate how the choice of a test case generator influences the detection of invariants, which are key to identifying consistent behaviors and potential anomalies in REST APIs. By examining the impact of transitioning between tools like RESTest, RESTler and RESTTestGen. This study aims to provide developers and testers with valuable insights into selecting the most appropriate

tool for their testing needs, ultimately leading to the development of more reliable and high-quality APIs.

DATSET – We will start with the dataset used in the paper and expand our research onto other API's. AWS MediaConnect, **AWS Lambda**, **GitHub v3 REST API** etc. We will be considering precision matrix.

2. How will the solution solve the problem?

❖ For research question 1

Step 1: Run the Restest on the OAS specification and record the requests and responses.
Step 3: Change or mutate OAS specification (based on path or variables)
Step 4: Run beet on the **mutated** OAS specification to generate declaration file.
Step 5: Run Restest to generate the sample requests and responses for Rest api's
Step 6: Compare the invariants and analyze.

❖ For research question 2

Step 1: Is to use the Rest Api's from the OAS specification to generate testcases from Restest
Step 2: Next, we will use Restler-fuzzer to generate testcases which can be fed to the beet.
Step 3: Then we will generate testcases from Restestgen
Step 4: In the next step we will compare the invariants generated by all three backbox testers and analyze the result.

3. How will you evaluate your solution?

We will be evaluating our solution by answering the following questions:

a. Are we able to generate a greater number of valuable invariants or test oracles than before?
b. Are we losing invariants due to the modifications done to the Specifications?
c. We will determine the true positives and false positives based on that we will calculate the precision.