Project Plan Research on AGORA

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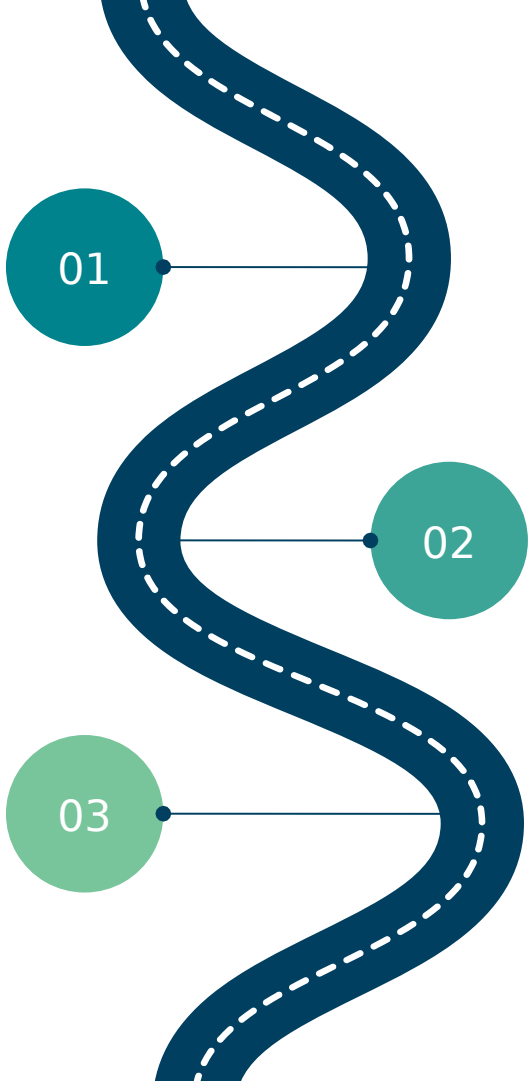

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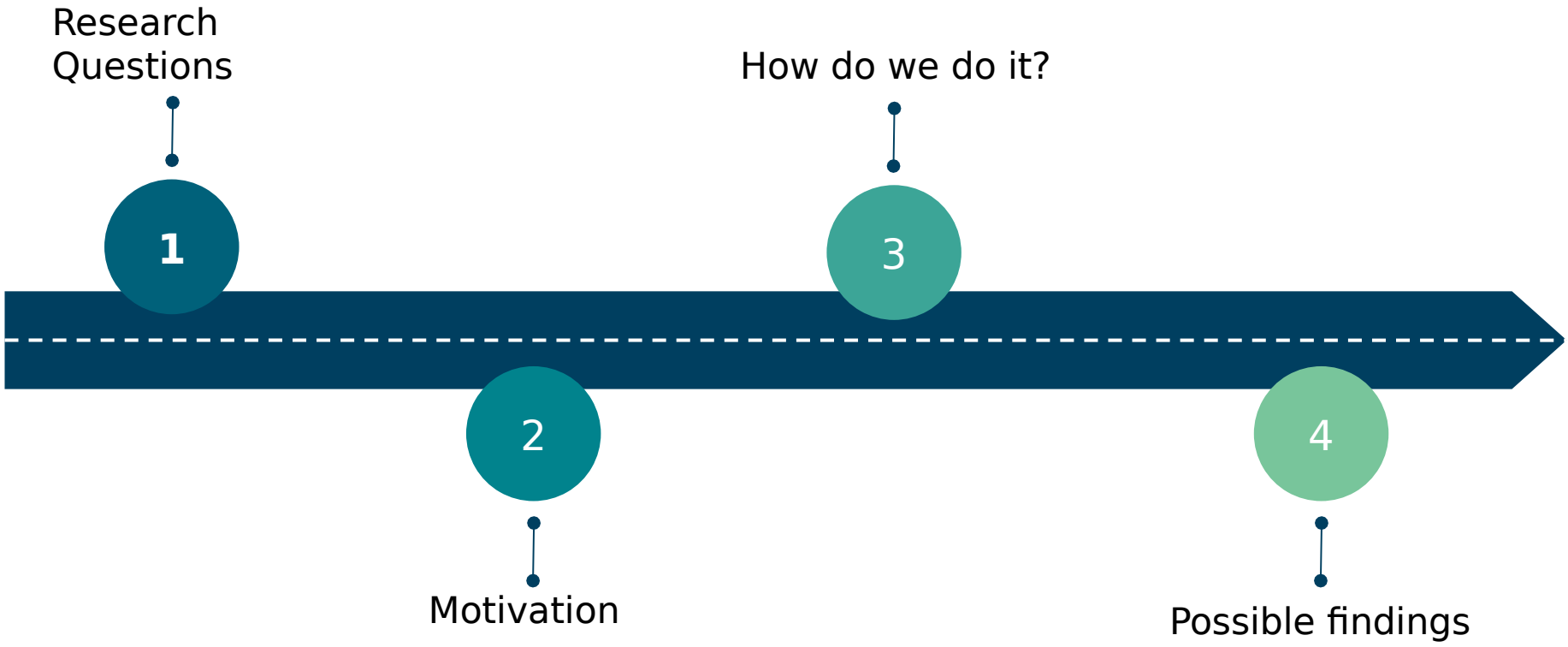
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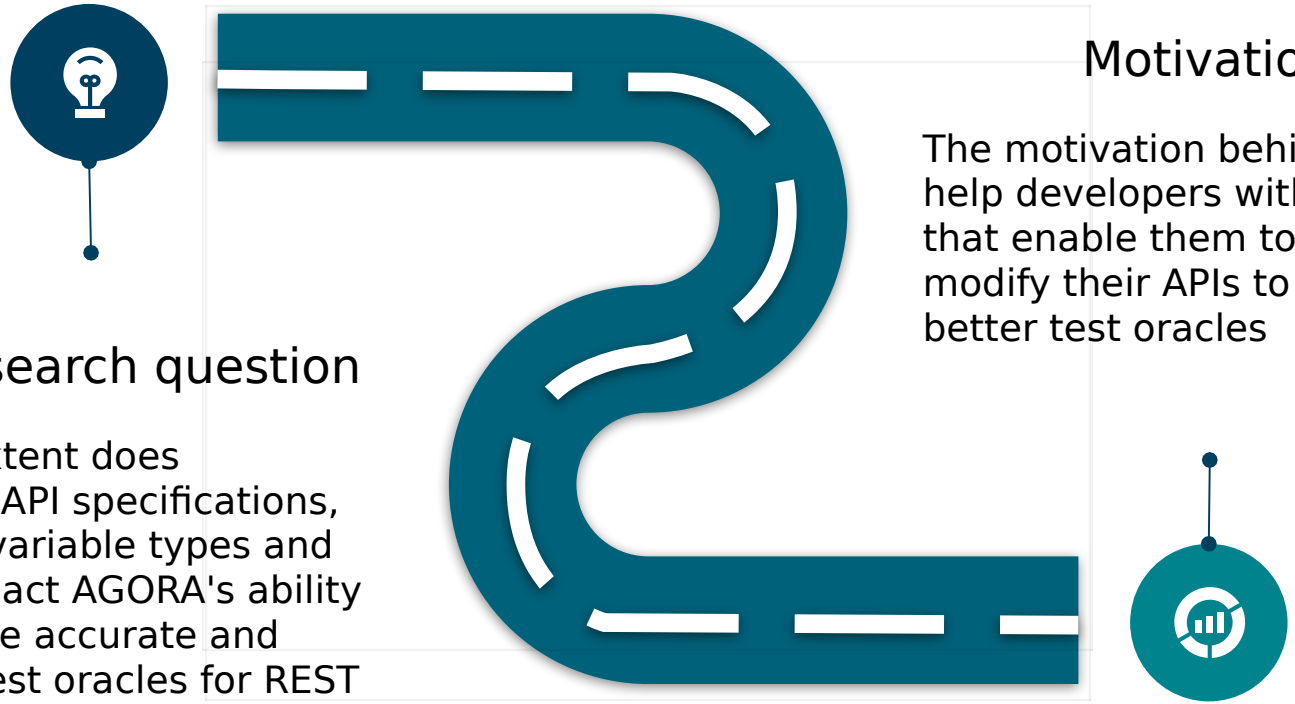
Research Questions & Motivation



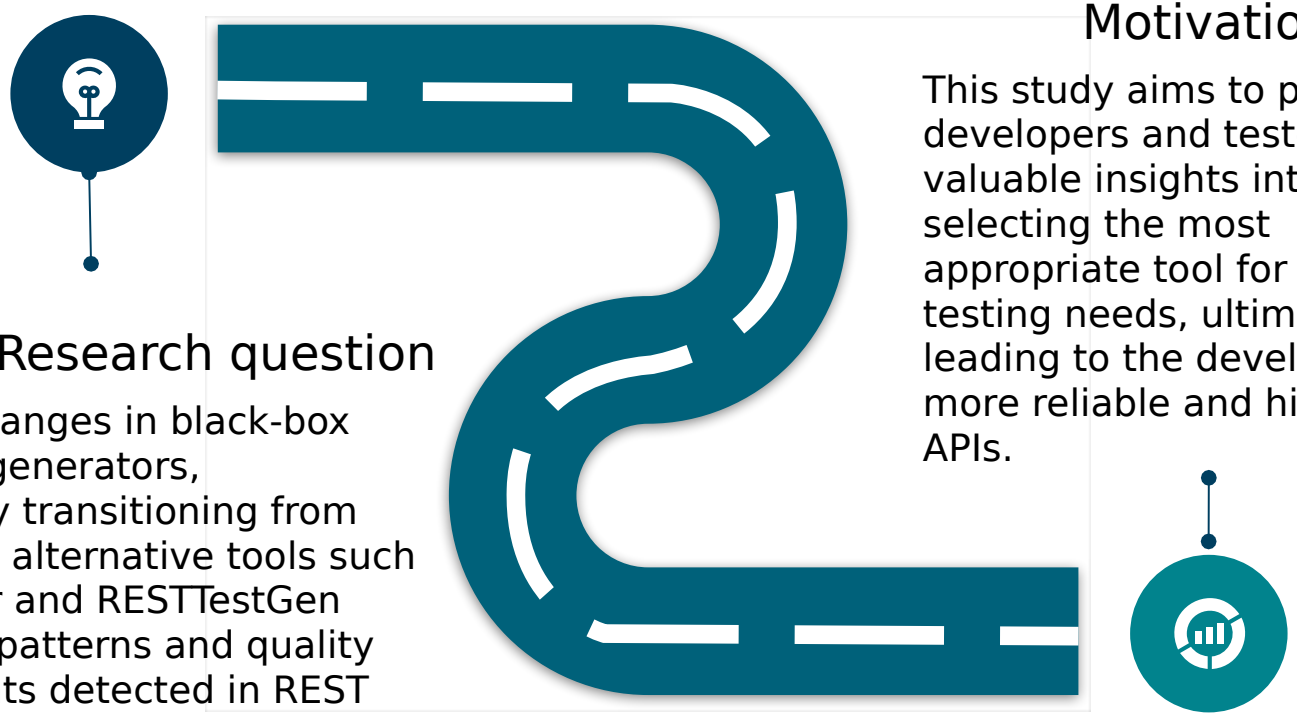
Motivation

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

First Research question

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?

Research Questions & Motivation



Second Research question

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 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.

How do we do it ? RQ1

- Step 1

  Run the Restest on the OAS specification and record the requests and responses.

- Step 2

  Change or mutate OAS specification (how? We will discuss this later in the next slides)

- Step 3

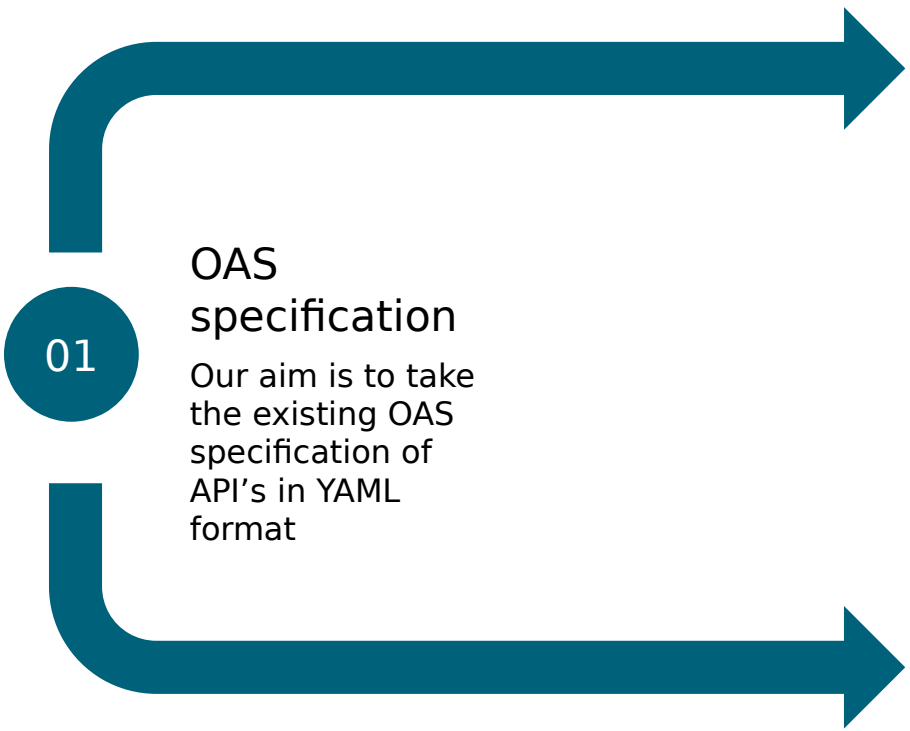
  Run beet on the **mutated** OAS specification to generate declaration file.

How do we do it ? RQ1

- Step 4

  Compare the invariants and analyze.

Mutation



01

OAS specification

Our aim is to take the existing OAS specification of API’s in YAML format

02

Change or modify parameters of the API

Changing the Data type, values and exploring multiple paths of a single API.
This will force beet to generate declaration file with modified values in turn affecting daikon to generate varying invariants.
String age = “15”; Int age = 15
0 < Age.length >2 ; 5 < Age > 30

03

What If test cases are generated with modified Specification?

Age > 5

03

If test cases are generated with modified Specification?

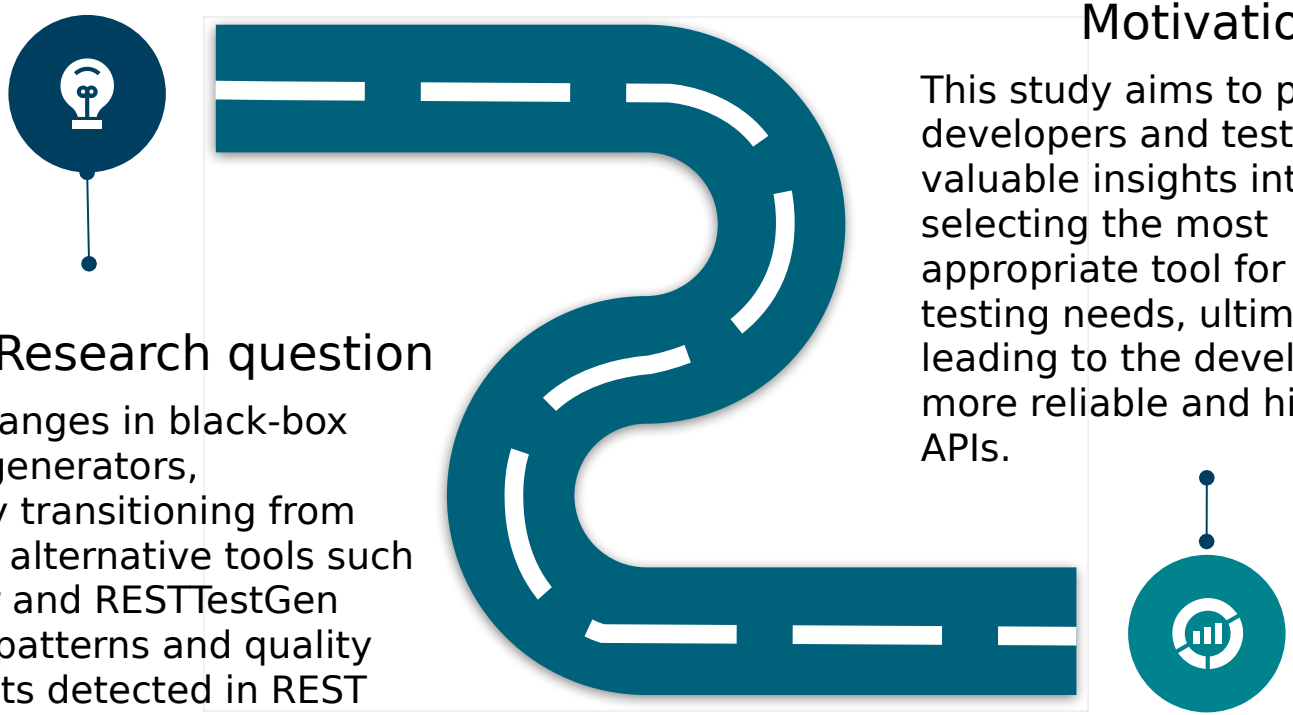
Reveal type handling and validation strengths or weaknesses within the system. For example:

Changing a string to an integer: For a parameter expected to be a string (e.g., countryOfResidence changed to an integer), could the system reject the request, or does it attempt a type conversion, potentially leading to errors or unexpected behavior?

Boolean instead of a string: For parameters like boardType, providing a boolean instead might test the system's ability to handle completely irrelevant types for a parameter.

How does Agora Handle these scenarios ? Are we producing more invariants?

Flash back : Research Questions & Motivation



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How do we do it ? RQ2

- Step 1

  We will use the OAS specification to generate test cases from Restest

- Step 2

  We will use Microsoft’s restler-fuzzer to generate test cases which can be fed to beet.

- Step 3

  Generate test cases from Restestgen

Both of these approaches are able to generate test cases in csv formats.

How do we do it ? RQ2

- Step 4

  We will compare the invariants generated by all three backbox testers and analyze the result.

  How do we analyse?

  Calculating precision - (% valid test oracles)

  1. If we are losing any valuable invariants?
  2. Are we able to generate more meaningful invariants with other testers?
  3. We will also combine requests and responses from all three testers to answer above 2 questions.

THANK YOU