Property Based API Testing

EDD Workshop Session

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March 6, 2025

1. OpenAPI Basics

2. Property-Based-Testing Basics

3. Applying PBT to OpenAPI /-Generator

Section 1

OpenAPI Basics

OpenApi: About

- API description language on top of JSON schema
- intended for REST and JSON RPC APIs with `JSON` or `XML` payloads
- language independent API specification written in `JSON` or `YML`
- plenty of generators and tools for individual language bindings
- client and server stubs generation for models and api

OpenApi: Building Blocks

- General info block (title, license, server, tags, ...)
- Operations (HTTP-verb + Path, request and responses, media-types)
- Schemata (named and anonymous models, parameters)
- Security (OAuth 2.0, HTTP BasicAuth, ...)
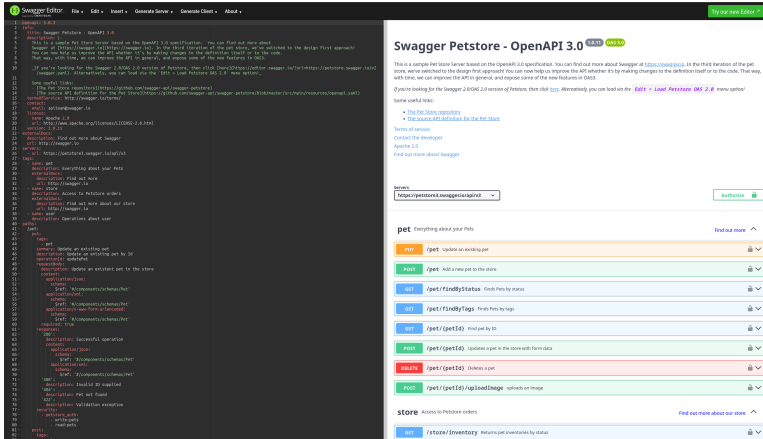
OpenApi: Swagger Editor

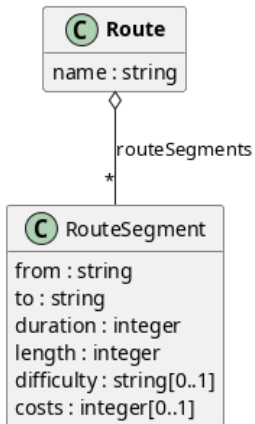**Figure 1:** Editieren von OpenApi-Dateien in Swagger Editor.

A1: Modelliere in OpenAPI

Figure 2: Klassendiagramm für das Modell "Route".

Section 2

Property-Based-Testing Basics

PBT: General

Figure 3: Das Unit-Test Dilemma: "testing can only find bugs, not prove their absence" (E.W. Dijkstra).

PBT: Basics

$$\forall s \in S : P(s) = \top, \qquad P : S \to \{\top, \bot\} \tag{1}$$

- S: state space of valid instances
- P: property to prove, candidates involve [1]:
  - invariants,
  - round-trips,
  - symmetry,
  - commutativity,
  - idem-potency, and
  - induction

Section 3

Applying PBT to OpenAPI /-Generator

Folie 3

[1] S. Sahayam, "Property-based testing patterns." Jun. 2016. Available: https://blog.ssanj.net/posts/2016-06-26-property-based-testing-patterns.html