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OpenAPI

Revisiting RESTful API, standardizing how REST APIs are described.

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Agenda

Background

- OpenAPI Initiative (OAI).
- OpenAPI Specification (OAS).
- Tools and Libraries implementing the OAS.

Demo

- Book store.
  - Writing the API spec.
  - Interactive documentation.
  - Implement and run a microserver.

OpenAPI Initiative (OAI)

OpenAPI initiative

- Open governance structure under the Linux Foundation.
- Focused on creating, evolving and promoting a vendor neutral description format.

Current Members

- Google, IBM, Microsoft, Adobe, ebay, SAP ...

History

- March 2015, SmartBear Software acquired the open source Swagger API specification.
- November 2015, SmartBear, helped create OAI, under the sponsorship of the Linux Foundation.
- July 2017, the OpenAPI Initiative released version 3.0.0 of its specification

OpenAPI Specification (OAS)

- Defines a standard interface description for REST APIs.
- Community-driven open specification within the OpenAPI Initiative.
- Use cases include, but are not limited to:
  - Interactive documentation.
  - Code generation for documentation, clients, and servers.
  - Automation of test cases.

OpenAPI Specification (OAS) - API Requests

`PUT /api/v1/pets/cats?color=orange HTTP/1.1`	Request line <Method> <Path>?<query> <Protocol>
`Content-Type: application/json` `Host: example.com`	Headers
	Empty line
{“name”: “Menashe”}	Body

OpenAPI Specification (OAS) - API Response

HTTP/1.1 200 OK	Request line <Protocol> <Code> <Status string>
Content-Type: application/json	Headers
	Empty line
{“name”: “Menashe”}	Body

OpenAPI Specification (OAS) - Document

Name	Type	Description
openapi	String	The OpenAPI Specification version.
Info	Object	Metadata about the API.
servers	Array	Connectivity information to a target server[s].
paths	Object	The available paths and operations for the API.
components	Object	An element to hold various schemas for the specification.
security	Object	Which security mechanisms can be used across the API.
tags	Array	Additional metadata.
externalDocs	Object	Additional external documentation.

OpenAPI Specification (OAS) - Paths

```yaml
/pets:
  get:
    description: Returns all pets from the system
    responses:
      '200':
        description: A list of pets.
        content:
          application/json:
            schema:
              type: array
              items:
                $ref: '#/components/schemas/pet'
```

OpenAPI Specification (OAS) - Components

```yaml
components:
  schemas:
    pet:
      type: object
      properties:
        name:
          type: string
        age:
          type: integer
          format: int32
        favoriteFood:
          type: string
```

Tools and Libraries implementing the OAS

- Official (?) and Unofficial tools.
  - https://github.com/OAI/OpenAPI-Specification/blob/master/IMPLEMENTATIONS.md
- SmartBear still brand their tools with the Swagger moniker.
- Libraries and other low-level tooling.
  - https://github.com/swagger-api/swagger-core
  - ...
- Editors.
  - https://github.com/Apicurio/apicurio-studio
  - ...
- User Interfaces.
  - https://github.com/swagger-api/swagger-UI
  - ...
- Code Generators.
  - https://github.com/swagger-api/swagger-codegen
  - ...

Demo

- Writing the API spec.
- Interactive documentation.
- Implement and run a microserver.

Book store OpenAPI document

- OpenAPI documents describe an API's services and are represented in either YAML or JSON formats. These documents may either be produced and served statically or be generated dynamically from an application.

```
openapi: "3.0.0"
info:
  version: 1.0.0
  title: AP 2018 Book service:
  - url: http://ap-2018-books.io/v1
paths:
  /books:
      get:
      summary: List all books
```

Book store docs using swagger-ui

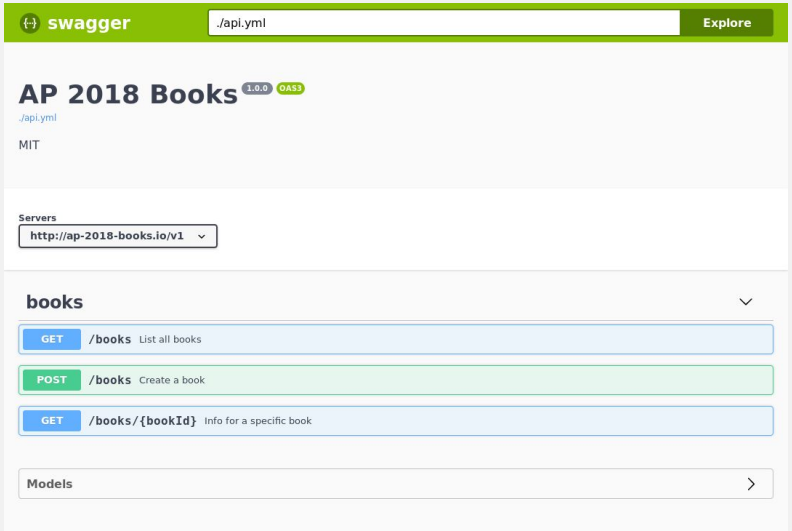
```
> # Run swagger-ui using docker.

> docker run --name openapi -p 8080:8080 -e
SWAGGER_JSON=/api/api-v1.yaml -v
$(pwd)/bookstore:/api:Z swaggerapi/swagger-ui


> # Get docker container IP.

> docker inspect -f '{{range
.NetworkSettings.Networks}}{{.IPAddress}}{{end}}'
openapi
```

http://172.17.0.2:8080/

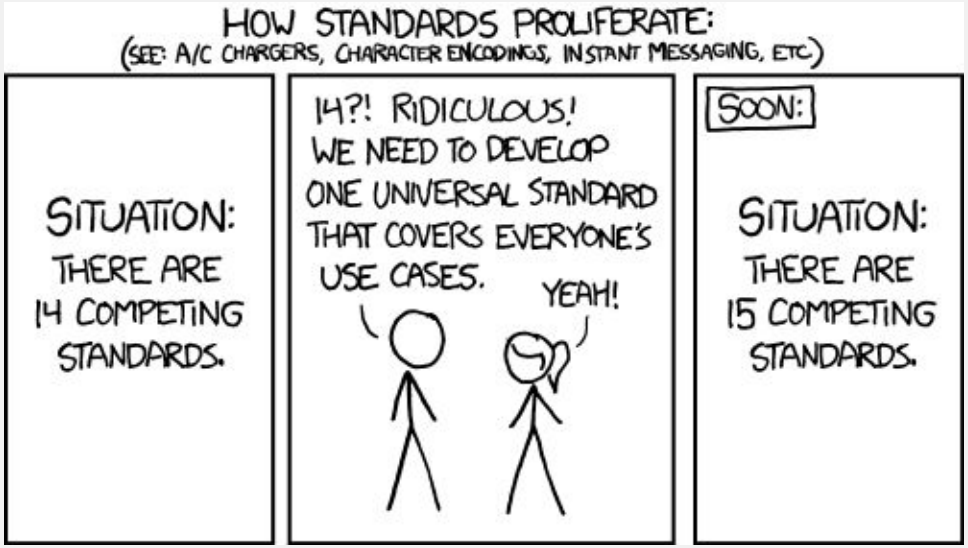


Book store server using Gen

```
# Installing gen utility.
go get -u -v github.com/wzshiming/gen/cmd/gen

# Building a Gorilla router, client and openapi docs.
gen route github.com/yaacov/AP-2018-OpenAPI/bookstore/v1/service
gen client -o ./bookstore/v1/client/client_gen.go github.com/yaacov/AP-2018-OpenAPI/bookstore/v1/service
gen openapi -o ./bookstore/v1/openapi/openapi.json github.com/yaacov/AP-2018-OpenAPI/bookstore/v1/service

# Run a testing server.
gen run github.com/yaacov/AP-2018-OpenAPI/bookstore/v1/service
```



https://xkcd.com/927/

Links:

- https://www.openapis.org/
- https://github.com/OAI/OpenAPI-Specification
- https://github.com/OAI/OpenAPI-Specification/blob/master/IMPLEMENTATIONS.md#implementations
- https://apis.guru/awesome-openapi3/


Q&A

Representational State Transfer (REST)

- Representational State Transfer (REST) is the architectural style that defines a set of constraints to be used for creating web services.
- RESTful web services, provide interoperability between computer systems on the Internet.
- REST-compliant web services allow the requesting systems to access and manipulate textual representations of web resources.
- RESTful web services, use a uniform and predefined set of stateless operations.

RESTful API Description Languages

Interface description languages (IDLs)

- Formal languages designed to provide a structured description of a RESTful web API that is useful both to a human and for automated machine processing.
- Used to generate documentation for human programmers.
- Allow automated generation of various software artifacts (libraries, clients and servers).

Hypertext-driven APIs

- The client is given a set of entry points and the API is discovered dynamically through interaction with these endpoints.

OpenAPI History

Swagger development began in early 2010. In March 2015, SmartBear Software acquired the open source Swagger API specification from Reverb Technologie.

In November 2015, SmartBear, announced that it was helping create a new organization, under the sponsorship of the Linux Foundation, called the Open API Initiative.

A variety of companies, including Google, IBM and Microsoft are founding members.

On 1 January 2016, the Swagger specification was renamed the OpenAPI Specification, and was moved to a new repository in GitHub.

Microservices

- Software development technique that structures an application as a collection of loosely coupled services.
- Services in a microservice architecture are independently deployable.
- The services are easy to replace.
- Services are organized around capabilities.
- Services are small in size, autonomously developed, independently deployable, decentralized and built and released with automated processes.
- Adheres to principles such as fine-grained interfaces.

OKD

OKD is a distribution of Kubernetes optimized for continuous application development and multi-tenant deployment. OKD adds developer and operations-centric tools on top of Kubernetes to enable rapid application development, easy deployment and scaling, and long-term lifecycle maintenance for small and large teams. OKD is the upstream Kubernetes distribution embedded in Red Hat OpenShift.

List of RESTful API DLs - not complete

- Web Services Description Language (WSDL)
- Web Application Description Language (WADL)
- CloudRail
- Google Cloud Endpoints
- Open Data Protocol (OData)
- OASIS standard[3] (Microsoft)
- OpenAPI Specification
- RESTful Service Description Language (RSDL)
- RESTful API Modeling Language (RAML)
- SERIN - Semantic Restful Interfaces[5]
- ...