Describe Your API With OpenAPI

Ben Ramsey • Nashville PHP May 2019

Hi, I’m Ben.

- Software Architect at ShootProof
- Organizer at Nashville PHP
- Love API design and development
- ramsey/uuid library
- Craft beer nerd
- @ramsey on Twitter

OpenAPI

What is it?

Who’s behind it?

OpenAPI Initiative (OAI)

“The OpenAPI Initiative (OAI) was created by a consortium of forward-looking industry experts who recognize the immense value of standardizing on how REST APIs are described. […] the OAI is focused on creating, evolving and promoting a vendor neutral description format.”

openapis.org/about

OpenAPI Specification (OAS)

“defines a standard, programming language-agnostic interface description for REST APIs […] When properly defined via OpenAPI, a consumer can understand and interact with the remote service with a minimal amount of implementation logic.”

github.com/OAI/OpenAPI-Specification

- No need to rewrite existing APIs
- Doesn’t require binding any software to a service
- You don’t have to be the service owner to write a description for it
- Allows for describing the service capabilities
- Not all services can be described
- Does not mandate a specific development process

Linux Foundation Collaborative Project

“[Linux Foundation] Collaborative Projects are independently funded software projects that harness the power of collaborative development to fuel innovation…”

openapis.org/faq


3scale
BY RED HAT

42crunch

api

ably

Acumatica
The Cloud ERP

APIFORTRESS

Assertible

Atlassian

BITMOVIN
Software to Solve Complex Video Problems

ca
technologies

dynatrace

ebay

Finxact
CORE AS A SERVICE

Google

HM Government

IBM

Intento

INTRINIO
FINTECH MARKETPLACE

ISA

Kong

Microsoft

MuleSoft

ORACLE + apiary


RepreZen

SAP

SMARTBEAR

software AG

Stoplight

SWIFT

talend

TeejLab
DATA | RESEARCH | SOFTWARE | INNOVATIONS

Tyk.io

WSO2

Swagger?

- The OpenAPI Specification was originally created by SmartBear Software
- It was originally named the “Swagger Specification”
- SmartBear donated Swagger to the OAI at its inception

But don’t call it “Swagger”

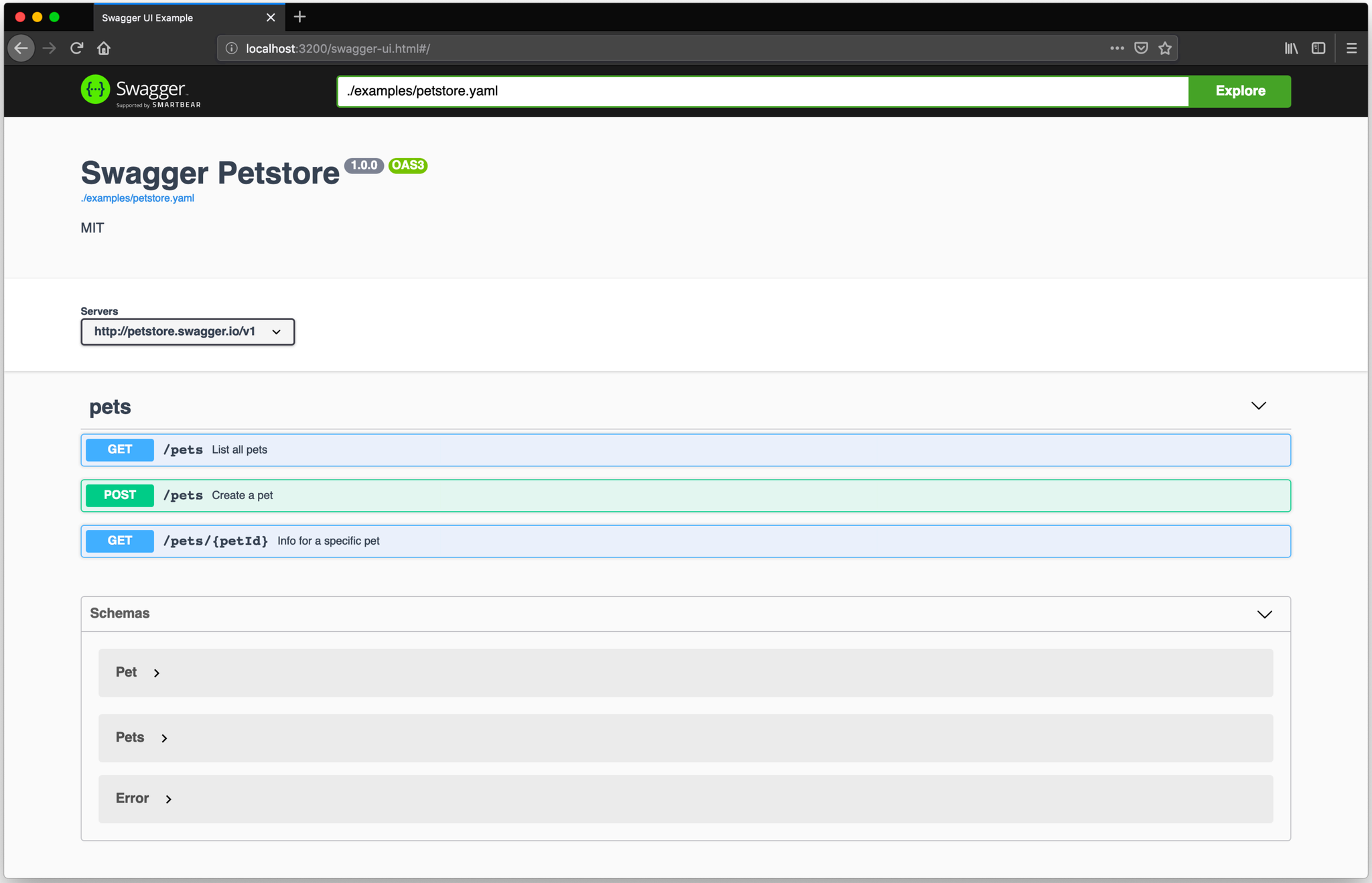
Version History

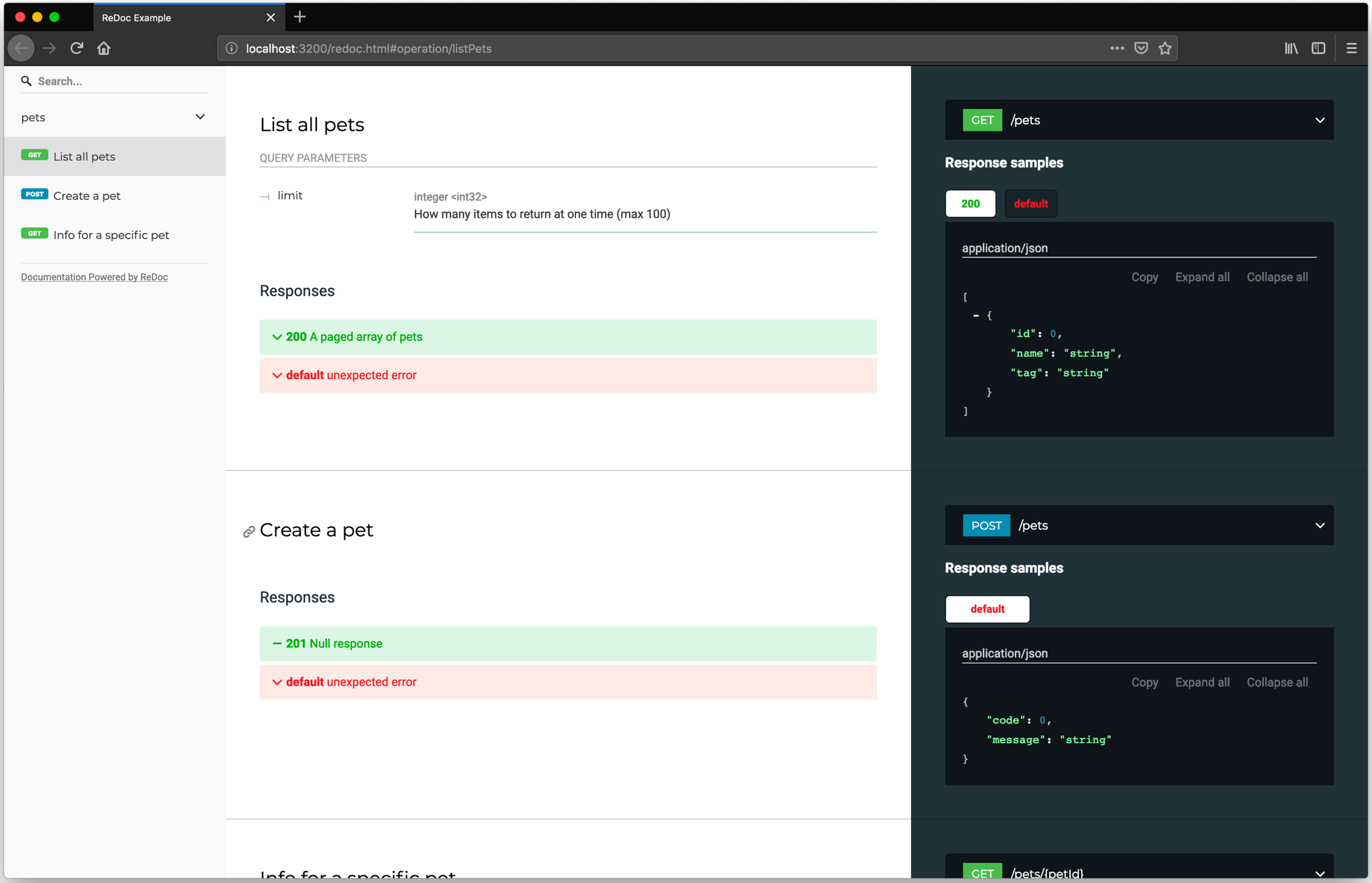
- Swagger 1.0 released in 2011
- Swagger 1.2 released as a formal specification in early 2014
- Swagger 2.0 released in late 2014
- SmartBear donated Swagger to the OAI on December 31, 2015

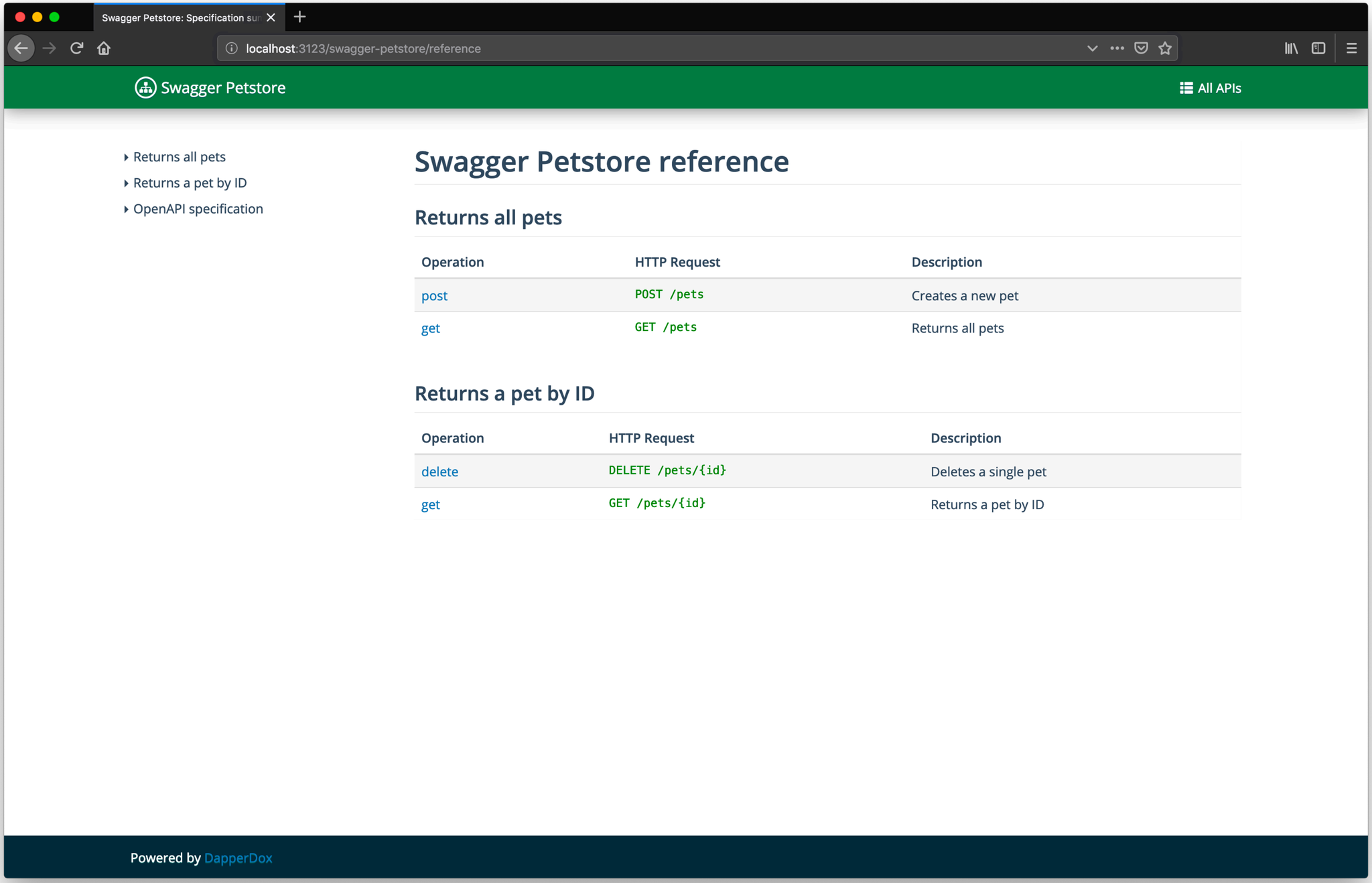
- OpenAPI Specification 3.0.0 released on July 26, 2017
- Followed by very minor patch releases:
  - 3.0.1
  - 3.0.2 (current version)
- OAI is currently working on version 3.1: https://github.com/OAI/OpenAPI-Specification/issues/1466

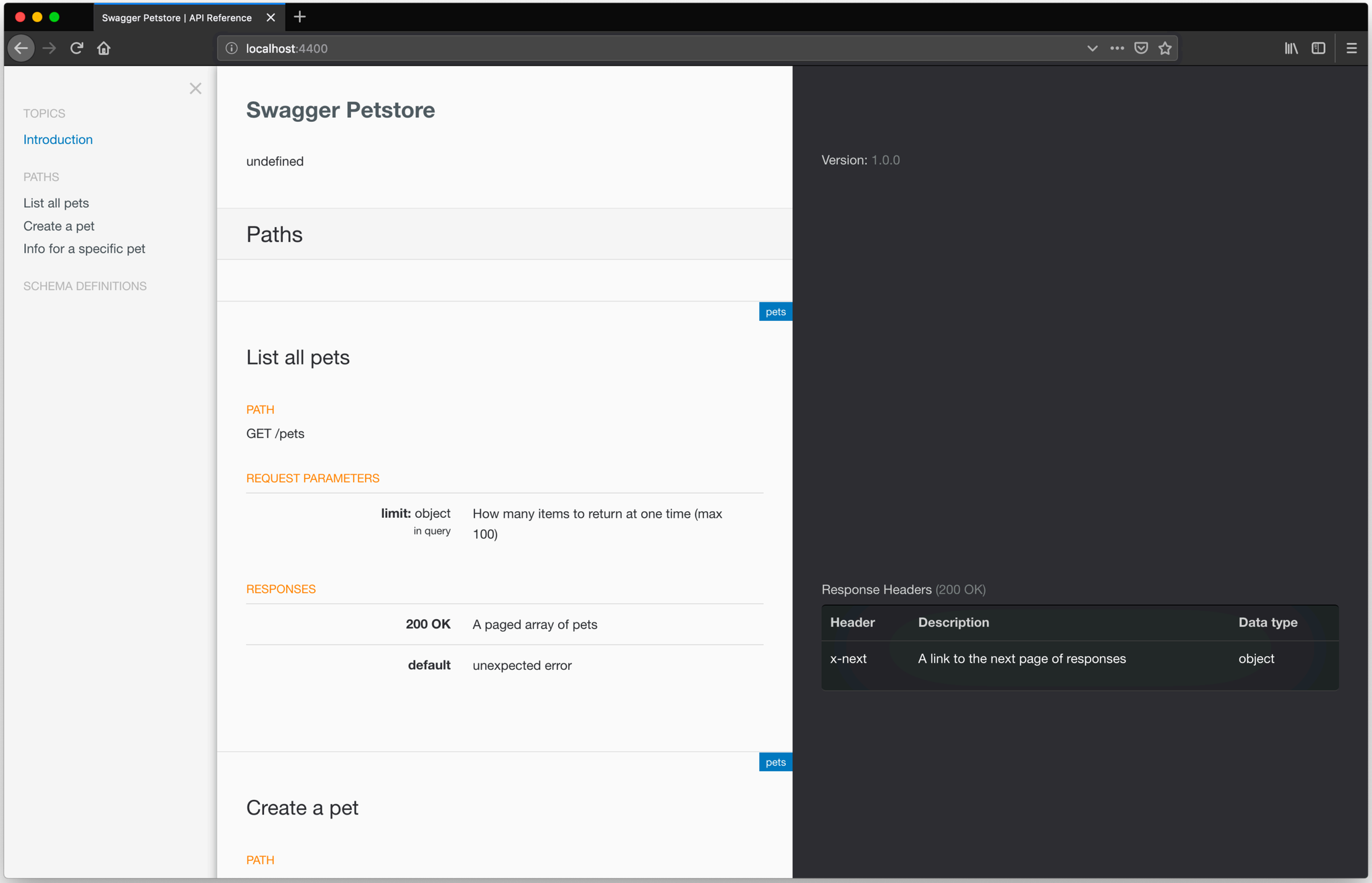
Boring! What does it look like?

```yaml
paths:
  /pets:
    get:
      summary: List all pets
      operationId: listPets
      tags:
        - pets
      parameters:
        - name: limit
          in: query
          description: How many items to return at one time (max 100)
          required: false
          schema:
            type: integer
            format: int32
      responses:
        '200':
          description: A paged array of pets
          headers:
            x-next:
              description: A link to the next page of responses
              schema:
                type: string
          content:
            application/json:
              schema:
                $ref: "#/components/schemas/Pets"
```


Swagger UI Example
localhost:3200/swagger-ui.html#/
Swagger
Supported by SMARTBEAR
./examples/petstore.yaml
Explore
Swagger Petstore
1.0.0
OAS3
./examples/petstore.yaml
MIT
Servers
http://petstore.swagger.io/v1
pets
GET /pets List all pets
POST /pets Create a pet
GET /pets/{petId} Info for a specific pet
Schemas
Pet
Pets
Error


ReDoc Example
localhost:3200/redoc.html#operation/listPets
Search...
pets
GET List all pets
POST Create a pet
GET Info for a specific pet
Documentation Powered by ReDoc
List all pets
QUERY PARAMETERS
limit
integer <int32>
How many items to return at one time (max 100)
Responses
200 A paged array of pets
default unexpected error
GET /pets
Response samples
200
default
application/json
Copy
Expand all
Collapse all
[
- {
"id": 0,
"name": "string",
"tag": "string"
}
]
Create a pet
Responses
201 Null response
default unexpected error
POST /pets
Response samples
default
application/json
Copy
Expand all
Collapse all
{
"code": 0,
"message": "string"
}
GET /pets/{petId}


Swagger Petstore: Specification sur
localhost:3123/swagger-petstore/reference
Swagger Petstore
All APIs
Returns all pets
Returns a pet by ID
OpenAPI specification
Swagger Petstore reference
Returns all pets
Operation
HTTP Request
Description
post
POST /pets
Creates a new pet
get
GET /pets
Returns all pets
Returns a pet by ID
Operation
HTTP Request
Description
delete
DELETE /pets/{id}
Deletes a single pet
get
GET /pets/{id}
Returns a pet by ID
Powered by DapperDox


Swagger Petstore | API Reference
localhost:4400
TOPICS
Introduction
PATHS
List all pets
Create a pet
Info for a specific pet
SCHEMA DEFINITIONS
Swagger Petstore
undefined
Version: 1.0.0
Paths
pets
List all pets
PATH
GET /pets
REQUEST PARAMETERS
limit: object
in query
How many items to return at one time (max 100)
RESPONSES
200 OK
A paged array of pets
default
unexpected error
Response Headers (200 OK)
Header
Description
Data type
x-next
A link to the next page of responses
object
pets
Create a pet
PATH

Parts of an OpenAPI Document

```yaml
openapi: "3.0.2"
info:
    version: 1.0.0
    title: Nashville PHP
    description: |-
        This is an example API for the
        [Nashville PHP user group](https://nashvillephp.org).
    contact:
        name: API Support
        url: https://nashvillephp.org
        email: support@nashvillephp.org
    license:
        name: MIT
        url: https://opensource.org/licenses/MIT
paths:
    /meetings:
        get:
            summary: Get a list of Nashville PHP meetings
            operationId: getMeetings
            responses:
                200:
                    description: A list of Nashville PHP meetings
```

- Name your root document **openapi.json** or **openapi.yaml**
- Key properties:
    - **openapi**: The version of the OpenAPI specification you are using
    - **info**: Metadata about your API
    - **paths**: Describes all your endpoints and their request and response bodies

Let’s Build an API!

Tips, Tricks, & Gotchas

$ref

```yaml
paths:
    /meetings:
        get:
            summary: Get a list of Nashville PHP meetings
            operationId: getMeetings
            responses:
                200:
                    content:
                        application/json:
                            schema:
                                title: List of Meetings
                                type: array
                                items:
                                    $ref: "#/components/schemas/meeting"
components:
    schemas:
        meeting:
            title: Meeting
            type: object
            properties:
                name:
                    title: Name of the meeting
                    type: string
```

Inheritance?

- Not exactly.
- JSON Schema provides boolean logic for subschemas.
  - anyOf
  - oneOf
  - allOf
- Some use allOf to provide a kind of inheritance, but it can lead to logical impossibilities.

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anyOf

```yaml
anyOf:
    - type: string
      maxLength: 5
    - type: number
      minimum: 0
```

Passes	Fails
“short”	“too long”
12	-5

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oneOf

```yaml
type: number
oneOf:
    - multipleOf: 5
    - multipleOf: 3
```

Passes	Fails
10	2
9	15

Inheritance?

- Not exactly.
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  - oneOf
  - allOf
- Some use allOf to provide a kind of inheritance, but it can lead to logical impossibilities.

allOf

```yaml
allOf:
    - type: string
    - maxLength: 5
```

Passes	Fails
“short”	“too long”

Inheritance?

- Not exactly.
- JSON Schema provides boolean logic for subschemas.
  - anyOf
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  - allOf
- Some use allOf to provide a kind of inheritance, but it can lead to logical impossibilities.

allOf

```yaml
allOf:
    - type: string
    - type: number
```

Fails	**Fails**
“a string”	42

Recursion

```yaml
components:
    schemas:
        meeting:
            title: Meeting
            type: object
            properties:
                name:
                    title: Name of the meeting
                    type: string
                relatedMeetings:
                    type: array
                    items:
                        $ref: "#/components/schemas/meeting"
```

Custom Properties

- OpenAPI allows extension through x-properties.
- Example:

```
x-beta: true
```

- Custom properties have no meaning to tools and documentation-generators, unless you write your own logic for them.

Tools

- Documentation:
  - Swagger UI: swagger.io/tools/swagger-ui/
  - ReDoc: github.com/Rebilly/ReDoc
  - Spectacle: sourcey.com/spectacle/
  - Dapperdox: dapperdox.io

Tools

- Much more:
  - Validators
  - Testing tools
  - Parsers
  - Mock Servers
- Check out openapi.tools by Matt Trask and Phil Sturgeon

Security

By poking around your OpenAPI specification, some tools can look out for attack vectors you might not have noticed.

Name	Language	v2	v3	GitHub
API Contract Security Audit - Upload OpenAPI file, get detailed report with located vulnerabilities, possible attack scenarios, ways to remediate.	SaaS	✅	❌	

Converters

Various tools to convert to and from OpenAPI standards. Useful for working with various API formats.

Name	Language	v2	v3	GitHub
Apimatic Transformer - Transform API Descriptions to and from RAML, API Blueprint, OAI v2/v3, WSDL, etc.	SaaS	✅	✅	
API Flow - Convert from and to multiple formats. Linking to Phil's fork because the original is completely broken	JavaScript	✅	👷	
Google Gnostic - Compile OpenAPI descriptions into equivalent Protocol Buffer representations	Go	✅	✅	
swagger2openapi - Upgrade specs from OpenAPI v2.0 to v3.0, bundling into one mega file or respecting $refs	Node.js	✅	✅	
OAS RAML Converter - Converts between OAS and RAML API specifications	Node.js	✅	✅	
OData OpenAPI - OData 4.0 to OpenAPI 3.0.0 converter	XSLT	✅	✅	
OpenAPI Filter - Filter internal components from OpenAPI definitions	Node.js	✅	✅	
OData.OpenAPI - Convert an Edm (Entity Data Model) to OpenApi 3.0	.NET	❌	✅	
pyswagger - Client & converter in Python, which is type-safe, dynamic, spec-compliant.	Python	✅	👷	
odata2openapi - OData 4.0 to OpenAPI 2 converter	Node.js	✅	❌	
avantation - Generate OpenAPI 3.x specification from HAR.	TypeScript	❌	✅	

openapi-viewer - Browse and test a REST API described with the OpenAPI 3.0 Specification	Vue.js	❌	✅	
openapi-ui - React based OpenAPI 3.0+ documentation generator	React.js	❌	✅	
ReDoc - OpenAPI/Swagger-generated API Reference Documentation	React.js	✅	✅	
widdershins - Generate Slate/Shins markdown from OpenAPI 2.0/3.0.x	Node.js	✅	✅	
openapi3-generator - Use your API OpenAPI 3 definition to generate code, documentation, and literally anything you need.	Node.js	❌	✅	
MrinDoc - Open API spec viewer.	Vue.JS	✅	✅	
RapiDoc - Custom Element to view OpenAPI spec.	Custom Element	✅	✅	
RapiPdf - Custom Element to generate PDF from OpenAPI spec.	Custom Element	✅	✅	
Stoplight - Create beautiful, customizable, interactive API documentation generated from your OpenAPI Specification, integrated with the Stoplight platform	SaaS	✅	✅	
Bump - Bump generates elegant documentations and changelogs from your OpenAPI specifications. Git diff, for your API.	SaaS	✅	✅	

Text Editors

Text editors to help build API docs.

Name	Language	v2	v3	GitHub
KaiZen-OpenAPI-Editor - Full-featured Eclipse editor for OpenAPI 2.0 and 3.0, also available on Eclipse Marketplace.	Java	✅	✅	
Atom/linter-swagger - This plugin for Atom Linter will lint Swagger 2.0 specifications or OpenAPI 3.0, both JSON and YAML using swagger-parser node package.	JavaScript	✅	✅	
Swagger Editor - Design, describe, and document your API on the first open source editor fully dedicated to OpenAPI-based APIs.	Node.js	✅	✅	
SwaggerHub - API design and documentation platform to improve collaboration, standardize development workflow and centralize their API discovery and consumption.	SaaS/On-Premise NodeJS	✅	✅	

Thank you!

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