

# BETTER API TESTING WITH OPENAPI SPECIFICATION

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HI! 🖐️

Re: [Multi month coupons on yearly subscriptions ...](#)

<https://groups.google.com/a/.../msg/api-discuss/.../GII938RcBAAJ> ▼

Nov 23, 2015 - I just ran into an **unexpected API behavior**, so I wanted to document it here and suggest some possible improvements. If you add a multi-month ...

[Unexpected behavior from --config option in](#)

<https://github.com/...> ▼

Apr 28, 2016 - Hi, I upgraded to Notebook 4.2 and use the new server extension deployment method (jupyter serverextension enable --py my\_extension), ...

[Unexpected behavior when callback throws an error · Issue #1159 ...](#)

<https://github.com/...> ▼

May 10, 2018 - `urlshortener.url.get(params, (err, res) => { if (err) return console.error('The API returned an error: ' + err); console.log('Long url is ${res.data}.`

[Unexpected API error \(HTTP code 502\): Bad response from](#)

<https://github.com/...> ▼

Jul 19, 2017 - Actual **behavior** After about 30 minutes or so, my Docker container ... db\_1 | LOG: autovacuum launcher shutting down **Unexpected API** error for ...

Dear Support: your docs don't show examples of how to use you software, just long API lists, which appear inaccurate.

Dear Nick: please look at the API

4:21 AM - 15 Feb 2018

Unit testing is not only for testing \*your\* code. The unit tests for Textcast found a big unexpected change in behavior of a [REDACTED] API.

9:31 AM - 18 Jun 2009

Seriously though, [COMPANY] api docs are [BLEEPING] trash. Not only incomplete in every way, but also inaccurate and wrong at times.

10:33 AM - 1 Sep 2014

Nothing like a brand new SaaS that has an API doc that's already incomplete and inaccurate. Just generate your doc and be done with it.

7:15 PM - 14 Mar 2013

Don't you hate it when you spend hours refactoring your code to find out that the problem is with a remote API's unexpected behavior

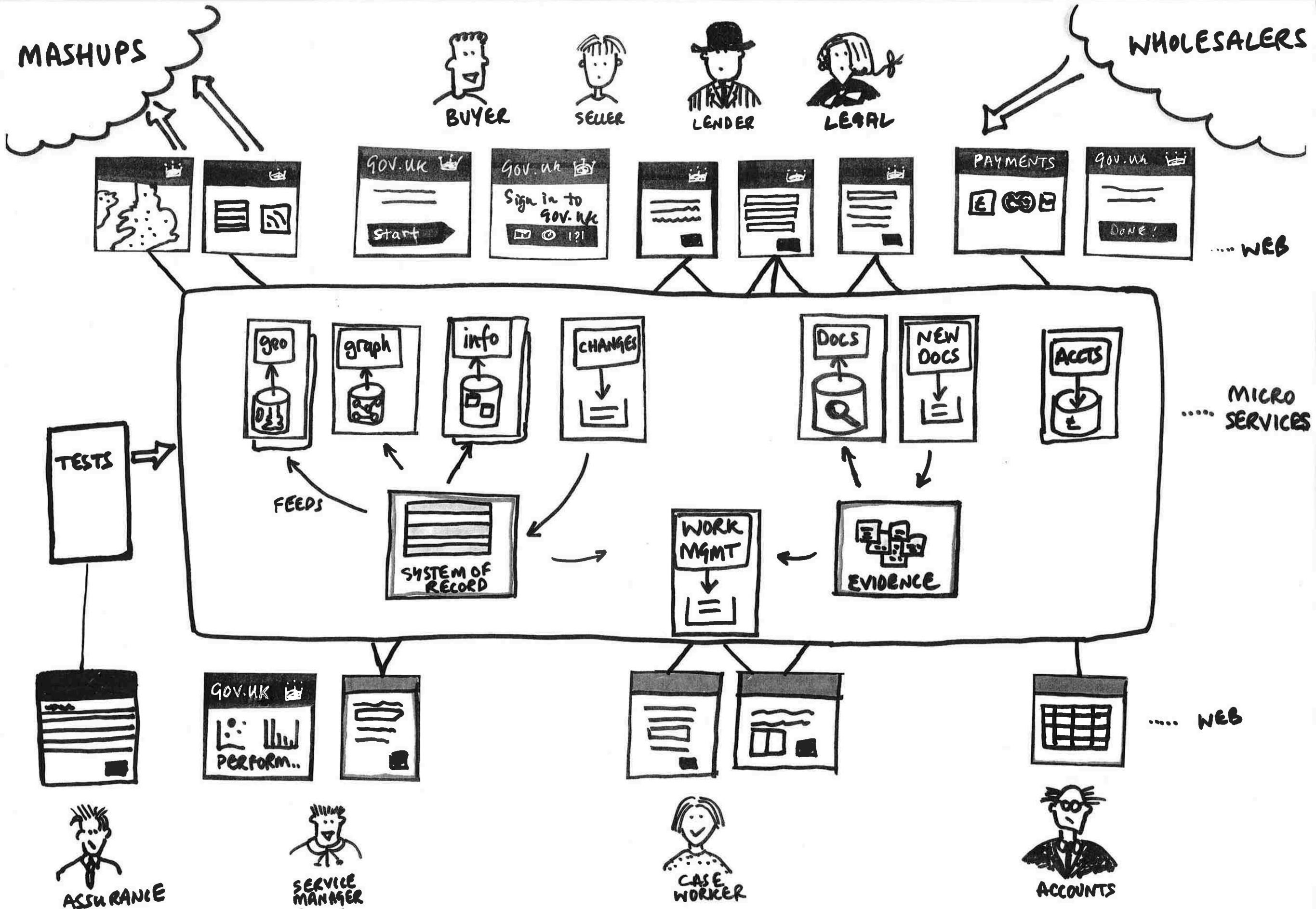
12:15 PM - 10 Nov 2009

Yay undocumented API features! Gotta love that unexpected behavior!

12:34 PM - 20 Jan 2014 from [Lansing, MI](#)







SINGLE SOURCE  
OF TRUTH 🙌

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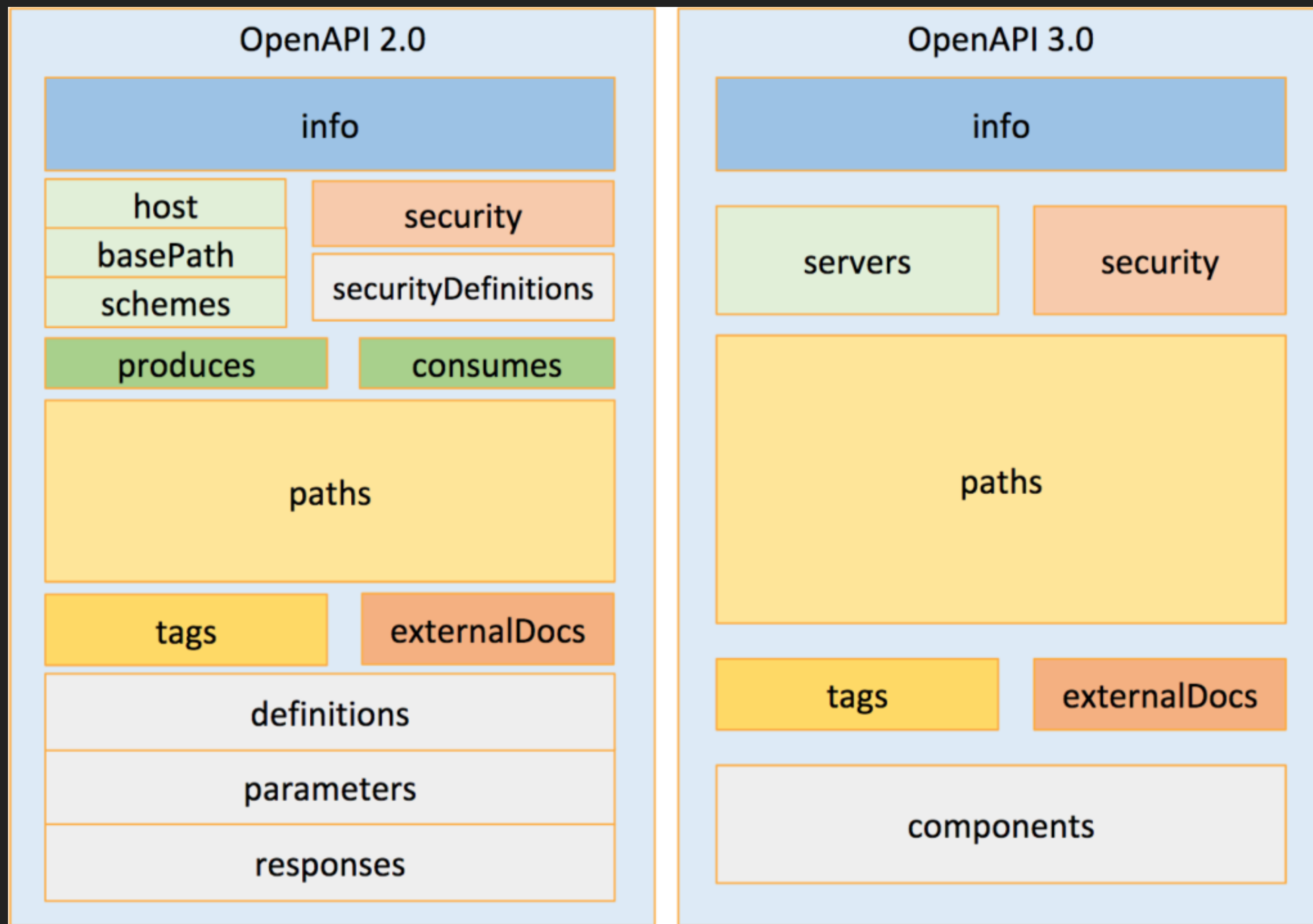
# SINGLE SOURCE OF TRUTH

- ▶ What does everything (humans and machines) look to?
- ▶ Messy, outdated design docs?
- ▶ Something that everyone agrees to - a contract



# OPENAPI SPECIFICATION

Standard, **structured** approach for  
describing APIs that is both  
**human** and **machine** readable



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# OPENAPI SPECIFICATION

- ▶ Development contract
- ▶ Prototyping and mocking
- ▶ Client SDKs and libraries
- ▶ Testing
- ▶ Server stubs



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# OPENAPI SPECIFICATION

- ▶ Simplifies describing an API
- ▶ Standardizes terminology
- ▶ "API Fastness"

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# OPENAPI SPECIFICATION

- ▶ Good tutorial to walk through the specification:
  - ▶ <https://apihandyman.io/openapi/>

**"OPENAPI IS A BRIDGE TO UNDERSTANDING AND BEING ABLE TO COMMUNICATE AROUND USING HTTP AS A TRANSPORT, AND OUR GREATEST HOPE FOR HELPING [PEOPLE] LEARN THEIR HTTPS AND 123S."**

**Kin Lane (@apievangelist)**

# DESIGN-FRIST APIS





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# DESIGN-FIRST APIS

- ▶ Consistency for users
- ▶ Important for critical APIs
- ▶ Code-first can be expensive
- ▶ Gain the benefits of using OpenAPI

# CONTRACT TESTING

Tests that ensure the API  
implementation meets the **standards**  
and **definitions** described in a **contract**

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# CONTRACT TESTING

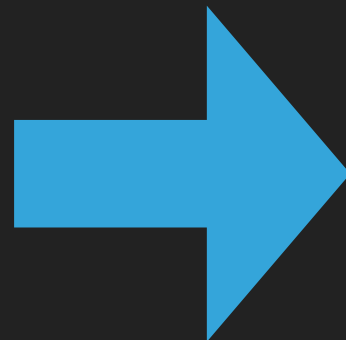
- ▶ Popularity has increased with the growth of microservices
- ▶ Some kind of contract available to all parties
- ▶ Enables independent deployments while not breaking other people's code
- ▶ What it is **not** testing:
  - ▶ Service availability
  - ▶ Load tolerance
  - ▶ Deployment integrity



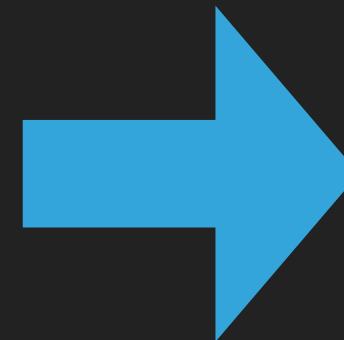
**OPENAPI  
SPECIFICATION**



**API RESPONSE**



**VALIDATION  
SERVER**



**PASS OR FAIL**

**BUT I ALREADY  
TEST MY APIS....**

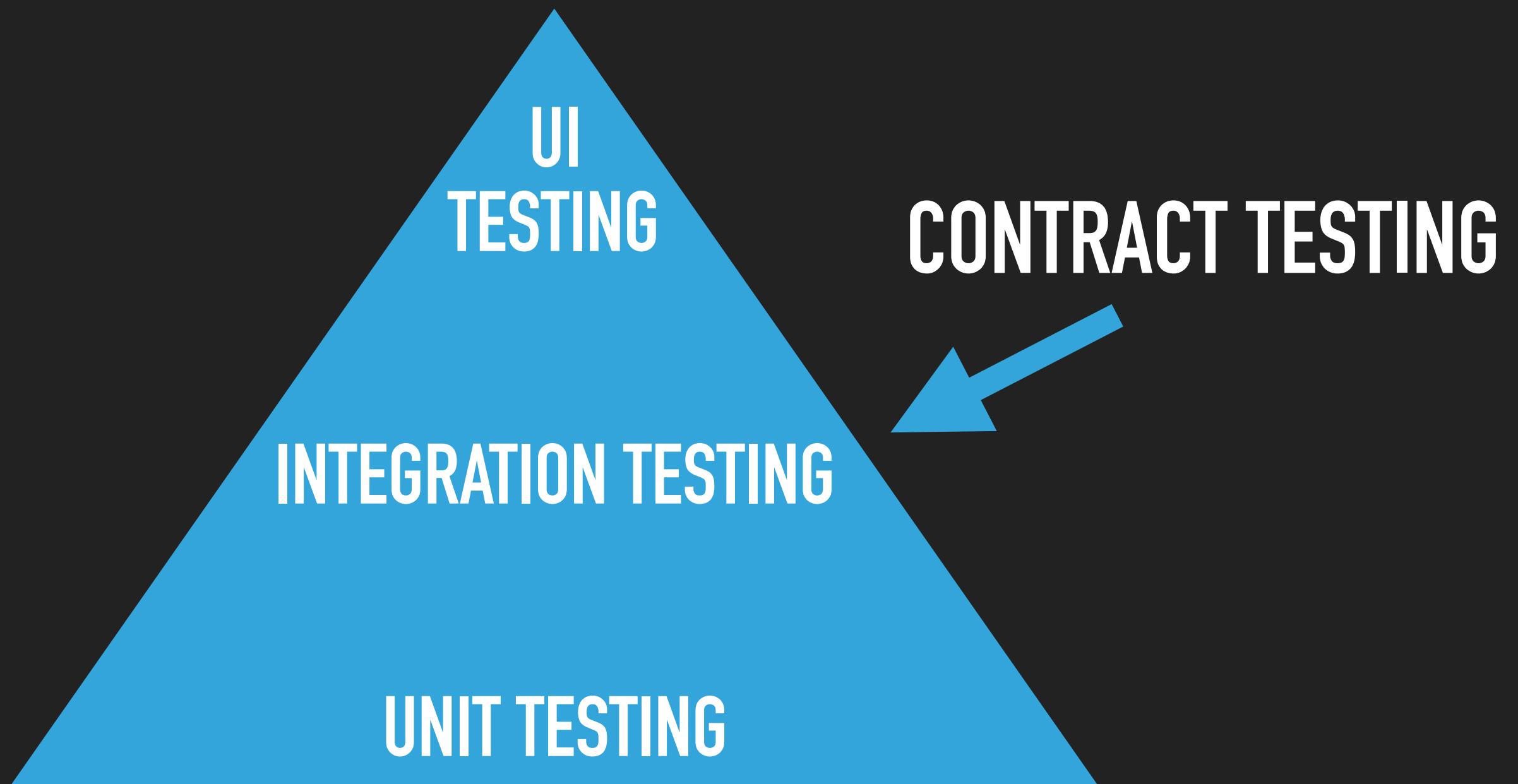


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## (SOME) DIFFERENT TYPES OF TESTING

- ▶ Integration/Functional Tests
- ▶ Unit Tests
- ▶ End-to-end Tests

# (SOME) DIFFERENT TYPES OF TESTING





**EXAMPLE: BROKEN  
SCHEMA** 

```
curl --request GET --url http://api.taylorbar.net/hello-world
```

200 👍



Test Greetings Scenario (0.009s)

Hello World, GET <http://api.taylorbar.net/hello-world> (0.009s)

✗ hello: hello is required

✓ output.status (eq) 2xx

✗ 1 of 2 tests failed



# API

```
{  
  "ello": "world"  
}
```

# SPEC

```
"get": {  
  "responses": {  
    "200": {  
      "description": "A greetings message",  
      "schema": {  
        "type": "object",  
        "required": [  
          "hello"  
        ],  
        "properties": {  
          "hello": {  
            "type": "string"  
          }  
        }  
      },  
      "examples": {}  
    }  
  },  
  "produces": [  
    "application/json"  
  ],  
  "consumes": [  
    "application/x-www-form-urlencoded"  
  ],  
  "parameters": []  
}
```

Test Greetings Scenario (0.012s)

Hello World, GET <http://api.taylorbar.net/hello-world> (0.011s)

- ✓ output.body (validate.contract) against JSON Schema
- ✓ output.status (eq) 2xx

✓ 2 tests passed



## Todo CRUD Scenario (0.831s)

Create Todo, POST <http://todos.stoplight.io/todos?apikey=123> (0.244s)

✗ user: user is required  
(root): Must validate all the schemas (allOf)

✓ output.status (eq) 201

Get Todo, GET <http://todos.stoplight.io/todos/61904> (0.13s)

✗ user: user is required  
(root): Must validate all the schemas (allOf)

✓ output.status (eq) 200

Update Todo, PUT <http://todos.stoplight.io/todos/61904?apikey=123> (0.137s)

✗ user: user is required  
(root): Must validate all the schemas (allOf)

✓ output.status (eq) 200

Delete Todo, DELETE <http://todos.stoplight.io/todos/61904?apikey=123> (0.126s)

✓ output.status (eq) 204

✓ output.body (validate.contract) against JSON Schema

Make Sure Deleted, GET <http://todos.stoplight.io/todos/61904> (0.192s)

✓ output.status (eq) 404

✓ output.body (validate.contract) against JSON Schema

✗ 3 of 10 tests failed



# API

```
{  
  "completed": null,  
  "completed_at": null,  
  "created_at":  
  "2018-07-18T18:33:19.341Z",  
  "id": 61907,  
  "name": "feed Yoda",  
  "updated_at":  
  "2018-07-18T18:33:19.341Z"  
}
```

# SPEC

```
"todo-full": {  
  "title": "Todo Full",  
  "allOf": [  
    {  
      "$ref": "#/definitions/todo-partial"  
    },  
    {  
      "type": "object",  
      "properties": {  
        "id": {  
          "type": "integer",  
          "minimum": 0,  
          "maximum": 1000000  
        },  
        "completed_at": {  
          "type": [  
            "string",  
            "null"  
          ],  
          "format": "date-time"  
        },  
        "created_at": {  
          "type": "string",  
          "format": "date-time"  
        },  
        "updated_at": {  
          "type": "string",  
          "format": "date-time"  
        },  
        "user": {  
          "$ref": "../common.oas2.yml#/definitions/user"  
        }  
      },  
      "required": [  
        "id",  
        "user"  
      ]  
    }  
  ]  
}
```



## Todo CRUD Scenario (0.902s)

Create Todo, POST <http://todos.stoplight.io/todos?apikey=123> (0.277s)

✓ output.status (eq) 201

✓ output.body (validate.contract) against JSON Schema

Get Todo, GET <http://todos.stoplight.io/todos/61908> (0.141s)

✓ output.status (eq) 200

✓ output.body (validate.contract) against JSON Schema

Update Todo, PUT <http://todos.stoplight.io/todos/61908?apikey=123> (0.145s)

✓ output.status (eq) 200

✓ output.body (validate.contract) against JSON Schema

Delete Todo, DELETE <http://todos.stoplight.io/todos/61908?apikey=123> (0.129s)

✓ output.status (eq) 204

✓ output.body (validate.contract) against JSON Schema

Make Sure Deleted, GET <http://todos.stoplight.io/todos/61908> (0.209s)

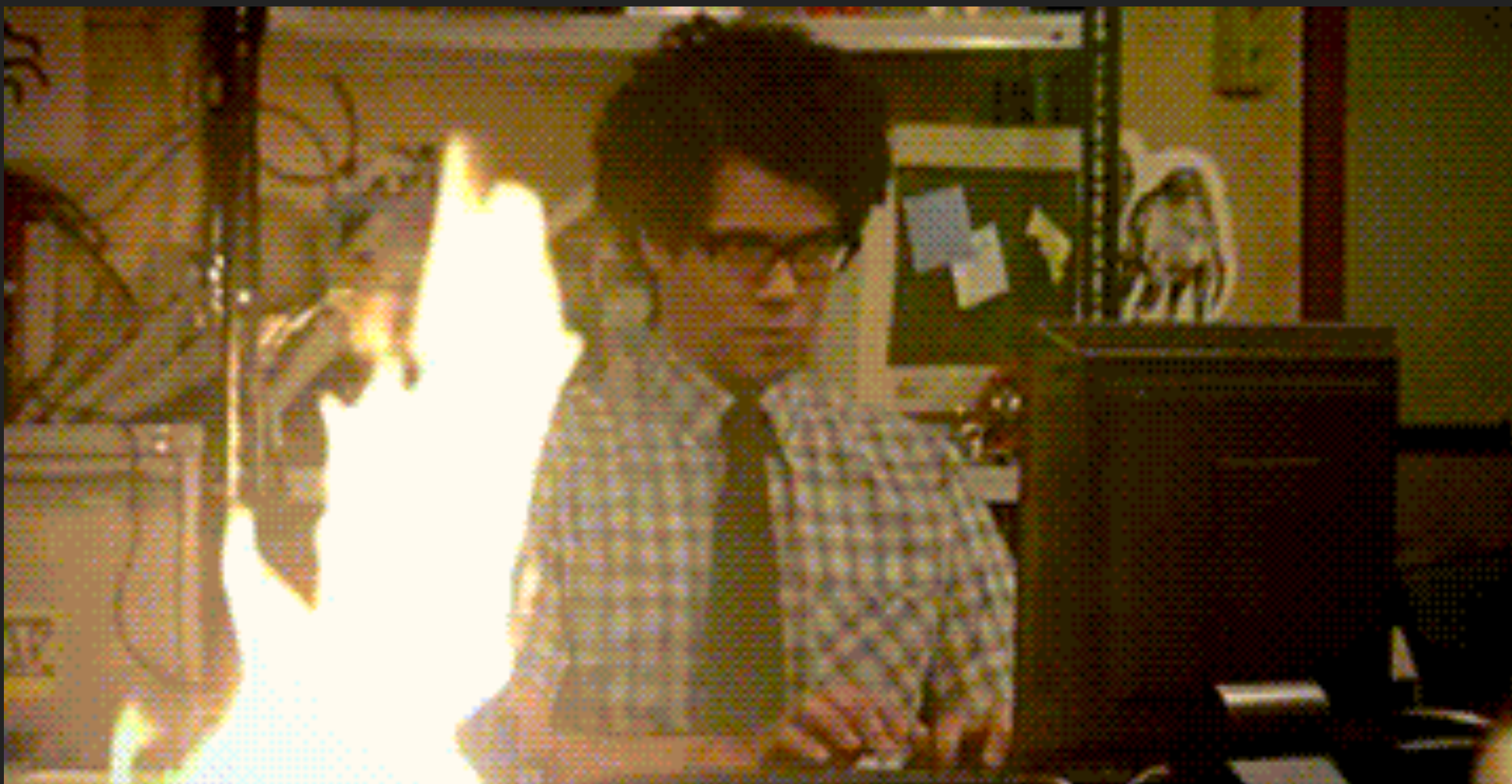
✓ output.status (eq) 404

✓ output.body (validate.contract) against JSON Schema



✓ 10 tests passed



EXAMPLE:  
SDKS 🔥



# ADD CONTRACT TESTING INTO CI/CD PIPELINE

 sendgrid / sendgrid-go  build passing

Current

Branches

Build History

Pull Requests

More options

✓ Pull Request #258 gofmt

Run standard gofmt command on project root.

- go version go1.10.3 darwin/amd64

Commit d6564a4

#258: gofmt

Branch master

ia authored and committed











#503 passed

Ran for 12 min 29 sec

Total time 36 min 45 sec

about a month ago

Build Jobs

✓ # 503.1	 </> Go: 1.6	 no environment variables set	⌚ 6 min 53 sec
✓ # 503.2	 </> Go: 1.7	 no environment variables set	⌚ 4 min 44 sec
✓ # 503.3	 </> Go: 1.8	 no environment variables set	⌚ 12 min 29 sec
✓ # 503.4	 </> Go: 1.9	 no environment variables set	⌚ 4 min 39 sec
✓ # 503.5	 </> Go: tip	 no environment variables set	⌚ 8 min

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# SDKS

- ▶ Helps maintainers
- ▶ Ensures API and SDK/libraries parity
- ▶ Go see Elmer Thomas' talk at 5:05pm on "Managing SDKs and their communities in multiple programming languages"

# EXAMPLE: DOCS







**WHAT ABOUT  
PACT TESTING?**



# SINGLE SOURCE OF TRUTH PITFALLS

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# SINGLE SOURCE OF TRUTH PITFALLS

- ▶ Forgetting the "why"
- ▶ Failing to version
  - ▶ "version" is in the Info Object
- ▶ Bad communication

# COMMUNICATION





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THEY BECOME THE CODIFICATION OF A SET OF DISCUSSIONS ABOUT WHAT A SERVICE API SHOULD LOOK LIKE, AND WHEN THEY BREAK, THEY BECOME A TRIGGER POINT TO HAVE CONVERSATIONS ABOUT HOW THAT API SHOULD EVOLVE.

Sam Newman, “Building Microservices: Testing”



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