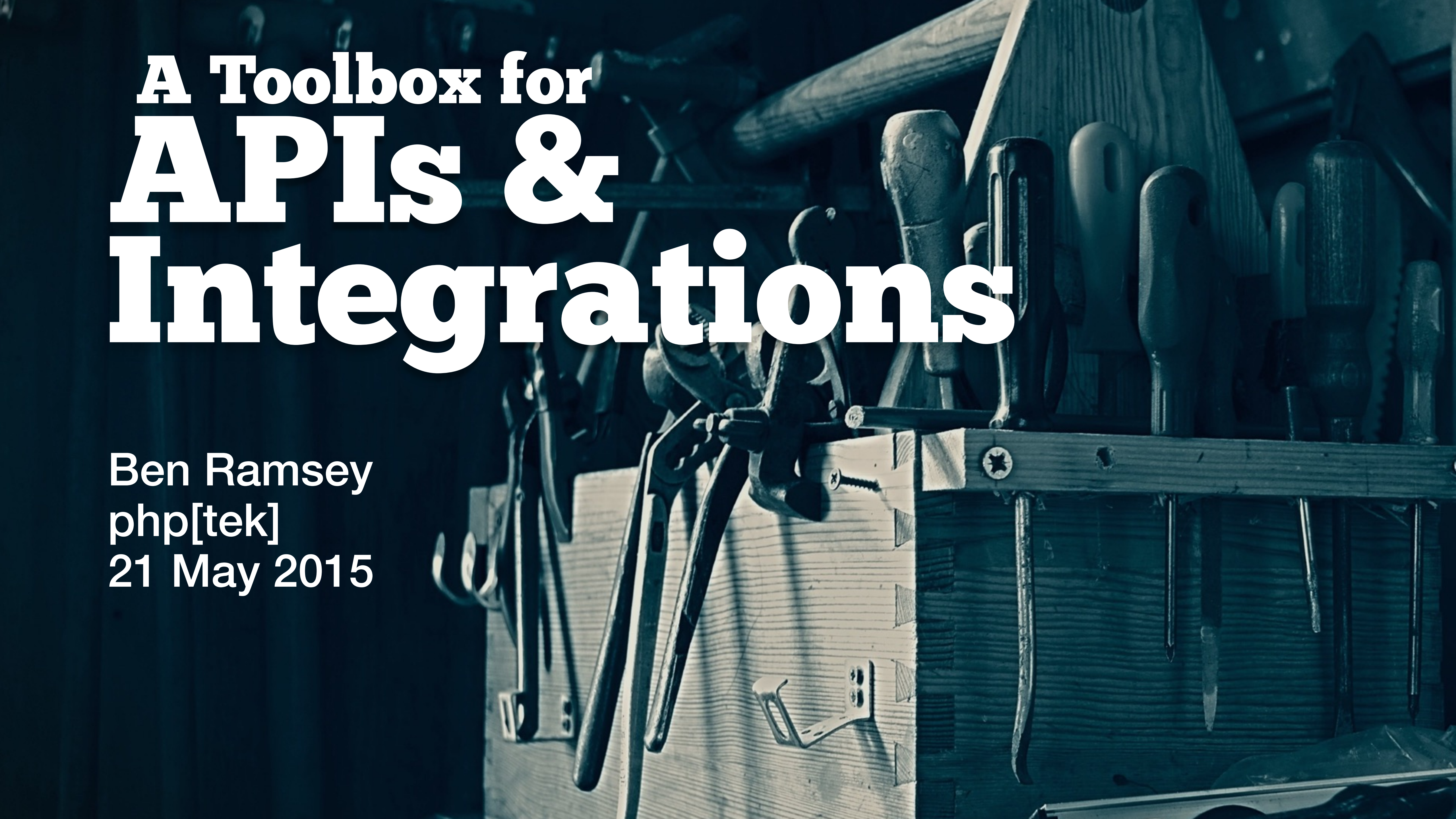




# A Toolbox for **APIs &** **Integrations**

Ben Ramsey  
php[tek]  
21 May 2015



## HI, I'M BEN.

I'm a web craftsman, author, and speaker. I build a platform for professional photographers at ShootProof. I enjoy APIs, open source software, organizing user groups, good beer, and spending time with my family. Nashville, TN is my home.

- ❖ Books
  - ❖ *Zend PHP Certification Study Guide*
  - ❖ *PHP 5 Unleashed*
- ❖ Nashville PHP & Atlanta PHP
- ❖ `array_column()`
- ❖ rhumsaa/uuid library
- ❖ virtPHP
- ❖ PHP League OAuth 2.0 Client

ShootProof [ ]



ShootProof [ ]

We're hiring.

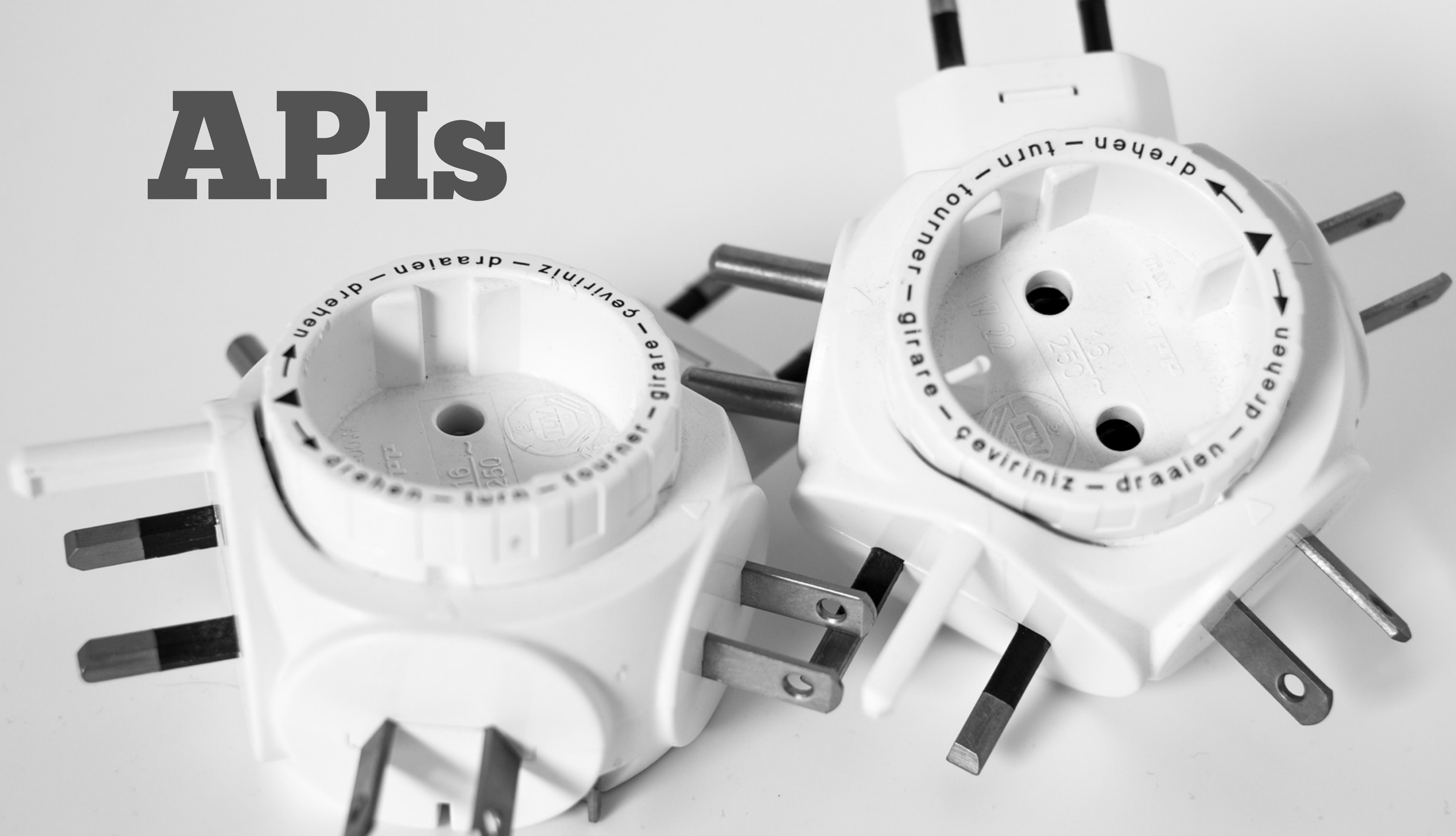
A close-up, high-contrast photograph of a wooden toolbox filled with various tools. The toolbox is made of light-colored wood and is open, revealing a collection of tools including screwdrivers, pliers, and wrenches. The tools are arranged in a somewhat organized manner, with some hanging from the sides and others lying flat. The lighting is dramatic, with strong highlights and deep shadows, creating a sense of depth and texture. The overall color palette is warm and earthy, dominated by the natural tones of the wood and the metallic sheen of the tools.

# A Toolbox for **APIs &** **Integrations**

application programming interface

making a whole of parts

# APIs



let's start with some opinions

# **RESTful**

representational state transfer

# RESTful

1. Client-server
2. Stateless
3. Cacheable
4. Layered system
5. Uniform interface
6. Code on demand

# **RESTful**

hypermedia as the  
engine of application state

# **RESTful**

## HATEOAS

General & Mills



# unLucky Charms

Goodness IN TOASTED OAT CEREAL  
WITH MARSHMALLOW BITS



ALPHABET  
CARDS  
Set No. 3 on package back

NET WT.  
12 OZ.

15 OZ.  
NET WT.

**BUT IT'S NOT  
"RESTful" IF YOU...**



**ENOUGH!**

# **Authentication**

OAuth 2.0

# Security

SSL all the things!

# URLs

In REST, URLs are opaque.

# URLs

They don't matter.

# URLs

But, it's nice to follow a pattern.

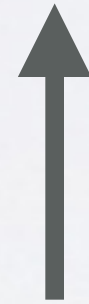
# URLs

Collection-Entity Pattern

**/collection/entity**

# URLs

***/contacts/1234***



collection



entity

# URLs: HTTP CRUD

**GET     /contacts**

Read collection of contacts

**POST    /contacts**

Create a new contact in this collection

**GET            /contacts/1234**

Read contact 1234

**PUT            /contacts/1234**

Update contact 1234

**DELETE        /contacts/1234**

Delete contact 1234

**PATCH         /contacts/1234**

Partial update contact 1234

# Building



# **Sinatra Pattern**

Simple mapping of HTTP methods to  
URI routes.

# **The Big (Micro) Three**

1. Slim
2. Lumen
3. Silex

```
$app->get(' /hello/:name', function ($name) {  
    echo "Hello, $name";  
} );
```

GET /hello/world HTTP/1.1  
Accept: \*/\*  
Accept-Encoding: gzip, deflate  
Connection: keep-alive  
Host: example.org  
User-Agent: HTTPie/0.8.0

HTTP/1.1 200 OK  
Connection: close  
Content-type: text/html; charset=UTF-8  
Host: example.org  
X-Powered-By: PHP/5.6.8

Hello, world

**What content type should I  
use for my API?**

# HAL-JSON

a simple JSON format that  
specifies a way to create  
hyperlinks between resources

# **HAL-JSON**

hypertext application language

# HAL-JSON

[stateless.co/hal\\_specification.html](http://stateless.co/hal_specification.html)

**HTTP/1.1 200 OK**  
**Connection: close**  
**Content-Type: application/hal+json**  
**Host: example.org**  
**X-Powered-By: PHP/5.6.9**

```
{
  "_embedded": {
    "contact": [
      {
        "_links": {
          "self": {
            "href": "/contacts/56"
          }
        },
        "address": "4545 Courthouse Rd",
        "city": "Westbury",
        "company_name": "Northwest Publishing",
        "county": "Nassau",
        "email": "twenner@aol.com",
        "first_name": "Tonette",
        "last_name": "Wenner",
        "phone1": "516-968-6051",
        "phone2": "516-333-4861",
        "state": "NY",
        "web": "http://www.northwestpublishing.com",
        "zip": "11590"
      }
    ]
  },
  "_links": {
    "next": {
      "href": "/contacts?page=57"
    },
    "prev": {
      "href": "/contacts?page=55"
    },
    "self": {
      "href": "/contacts?page=56"
    }
  }
}
```

```
{
  "_embedded": {
    "contact": [
      {
        "_links": {
          "self": {
            "href": "/contacts/56"
          }
        },
        ...
      }
    ]
  },
  "_links": {
    "next": {
      "href": "/contacts?page=57"
    },
    "prev": {
      "href": "/contacts?page=55"
    },
    "self": {
      "href": "/contacts?page=56"
    }
  }
}
```

# HAL-JSON

Package: [nocarrier/hal](#)

```
$app->get('/contacts', function () use ($app) {
    $page = $app->request->get('page');

    if ($page > 1) {
        $hal = new Hal('/contacts?page=' . $page);
        $hal->addLink('next', '/contacts?page=' . ($page + 1));
        $hal->addLink('prev', '/contacts?page=' . ($page - 1));
    } else {
        $page = 1;
        $hal = new Hal('/contacts');
        $hal->addLink('next', '/contacts?page=2');
    }

    $contacts = getContactsPage($page);

    foreach ($contacts as $id => $contact) {
        $resource = new Hal('/contacts/' . $id, $contact);
        $hal->addResource('contact', $resource);
    }

    $app->response->headers->set('Content-Type', 'application/hal+json');
    echo $hal->asJson();
});
```

\*Slim code

**How do I deal with error  
messages?**

# **vnd.error**

a simple way of expressing an  
error response in JSON

HTTP/1.1 404 Not Found

Connection: close

Content-Type: application/vnd.error+json

Host: example.org:8000

X-Powered-By: PHP/5.6.9

```
{
  "_links": {
    "help": {
      "href": "http://docs.example.org/api/contacts",
      "title": "Contacts API Documentation"
    }
  },
  "message": "Contact not found"
}
```

# **vnd.error**

Package: ramsey/vnderror

```

$app->get('/contacts/:id', function ($id) use ($app) {
    try {

        $contact = getContactById($id);
        $hal = new Hal('/contacts/' . $id, $contact);

        $app->response->headers->set('Content-Type', 'application/hal+json');
        echo $hal->asJson();

    } catch (ErrorException $e) {

        $vndError = new VndError('Contact not found');
        $vndError->addLink(
            'help',
            'http://docs.example.org/api/contacts',
            array('title' => 'Contacts API Documentation')
        );

        $app->response->setStatus(404);
        $app->response->headers->set('Content Type', 'application/vnd.error+json');
        echo $vndError->asJson();

    }
});

```

\*Slim code

**How do I authenticate  
users to allow access to my  
API?**

# **OAuth2 Server**

Package: league/oauth2-server

**Other options for building  
your APIs...**

# Apigility

1. Opinionated API builder
2. GUI interface to build APIs
3. Zend Framework under the hood
4. HAL and error responses
5. Built-in OAuth 2.0 server

## API LIST



▼

Status - version 1

2

Status

Ping

## REST service: Status (v1)

[General Settings](#)
[Content Negotiation](#)
[Fields](#)
[Authorization](#)
[Documentation](#)
[Source code](#)
**Name**

**Page size**

**Route matches**

**HTTP Entity Methods**
☒ GET
 ☐ POST
 ☒ PUT
 ☒ PATCH
 ☒ DELETE

**Route identifier name**

**HTTP Collection Methods**
☒ GET
 ☒ POST
 ☐ PUT
 ☐ PATCH
 ☐ DELETE

**Entity identifier name**

**Page Size Parameter**

**Hydrator Service Name**

**Collection Query String Whitelist**

**Collection Name**

**Entity Class**

**Collection Class**

# **Apigility**

[apigility.org](http://apigility.org)

# Apiary

1. Rapid prototyping of your API
2. API Blueprint
3. Server mocks
4. Documentation-driven dev



```
1 FORMAT: 1A
2
3 # Gist Fox API
4 Gist Fox API is a **pastes service** similar to [GitHub's Gist] (http://gist.github.com)
5
6 ## Authentication
7 Currently the Gist Fox API does not provide authenticated access.
8
9 ## Media Types
10 Where applicable this API uses the [HAL+JSON] (https://github.com/mikekelly/hal\_specification)
11
12 Requests with a message-body are using plain JSON to set or update resource states.
13
14 ## Error States
15 The common [HTTP Response Status Codes] (https://github.com/for-GET/know-your-http-well)
16
17 # Gist Fox API Root [/]
18 Gist Fox API entry point.
19
20 This resource does not have any attributes. Instead it offers the initial API affordances
21 HAL links.
22
23 ## Retrieve the Entry Point [GET]
24
25 + Response 200 (application/hal+json)
26   + Headers
27
28   | | | Link: <http://api.gistfox.com/>;rel="self",<http://api.gistfox.com/gists>;rel="collection"
29
30   + Body
31
32   | | | {
33   | | |   "_links": {
34   | | |     "self": { "href": "/" },
35   | | |     "gists": { "href": "/gists?{since}", "templated": true }
36   | | |   }
37   | | | }
38
```

## Gist

Gist-related resources of *Gist Fox API*.

### Gist

A single Gist object. The Gist resource is the central resource in the Gist Fox API. It represents one paste - a single text document.

The Gist resource has the following attributes:

- id
- created\_at
- description
- content

The states *id* and *created\_at* are assigned by the Gist Fox API at the moment of creation.

### Retrieve a Single Gist

GET

/gists/{id}

#### Parameters

| Name | Description                           | Detail  |
|------|---------------------------------------|---------|
| id   | ID of the Gist in the form of a hash. | string, |



Gist Fox API

Yours • foobar4



Documentation

Inspector

Editor



Try 'Apiary for Teams'



Listening at http://private-fc2f-foobar4.apiary-mock.com

Show Missed Request



| Resource    | Method | Status | Source         | Time              |
|-------------|--------|--------|----------------|-------------------|
| /gists/1234 | GET    | 200    | 70.194.138.221 | a few seconds ago |

This API request was compared to a documented resource but was found invalid. Check your request headers and body below.

Call Header

Show Expected

```
+ host: private-fc2f-foobar4.apiary-mock.com
+ connection: close
+ accept-encoding: gzip, deflate
+ accept: */*
+ user-agent: HTTPie/0.8.0
+ x-uidh: MTQ1NDk5NzMzMwBUc3kfeU7pgoz6YlXzDYNR4/zBP/e00oCTaPB1fHKvgw==
+ x-request-id: 085ee0a2-108c-45df-a39b-d7d2ca6add6c
+ via: 1.1 vegur
+ connect-time: 1
+ x-request-start: 1432063248525
+ total-route-time: 0
```

Response Header

Show Expected

```
Content-Type: application/hal+json
Link: <http://api.gistfox.com/gists/42>;rel="self", <http://api.gistfox.com/gists/42/star>;rel="star"
+ Access-Control-Allow-Origin: *
+ Access-Control-Allow-Methods: OPTIONS,GET,HEAD,POST,PUT,DELETE,TRACE,CONNECT
+ Access-Control-Max-Age: 10
+ x-apiary-transaction-id: 555b8d10b9b574030002b0e2
```

Response Body

Show Expected

Unknown real body media type. Content-type header is "application/hal+json" but body is not a parseable JSON. Parse error on line 4: ...sts/42/star" }, }, "id": "42", -----^ Expecting 'STRING', got '}'

Expected body: Content-Type is application/hal+json but body is not a parseable JSON: Parse error on line 4: ...sts/42/star" }, }, "id": "42", -----^ Expecting 'STRING', got '}'

Unknown real and expected type. No validator found.

```
{
  "_links": {
    "self": { "href": "/gists/42" },
    "star": { "href": "/gists/42/star" },
  },
}
```

# Apiary

[apiary.io](https://apiary.io)

A black and white photograph showing a large, disorganized pile of broken bricks and rubble. The bricks are scattered across the frame, with some still in their original rectangular shape and others shattered into smaller pieces. The background is a light, overcast sky. The word "Debugging" is overlaid in a large, bold, white serif font, centered horizontally and slightly above the middle vertically. The text is set against the dark, textured background of the bricks, making it stand out prominently.

# Debugging

# cURL

1. Ubiquitous
2. Swiss army knife
3. [curl.haxx.se](http://curl.haxx.se)

```
$ curl example.org/contacts\?page=43
```

```
{"_links":{"self":{"href":"\\/contacts?page=43"},"next":  
{"href":"\\/contacts?page=44"},"prev":{"href":"\\/contacts?  
page=42"}},"_embedded":{"contact":  
[{"first_name":"Roxane","last_name":"Campaign","company_name":  
"Rapid Trading Intl","address":"1048 Main  
St","city":"Fairbanks","county":"Fairbanks North  
Star","state":"AK","zip":"99708","phone1":"907-231-4722","pho  
ne2":"907-335-6568","email":"roxane@hotmail.com","web":"http:  
\\/\\/www.rapidtradingintl.com","_links":{"self":{"href":"\\/  
contacts\\/43"}}}]}}
```

# HTTPie

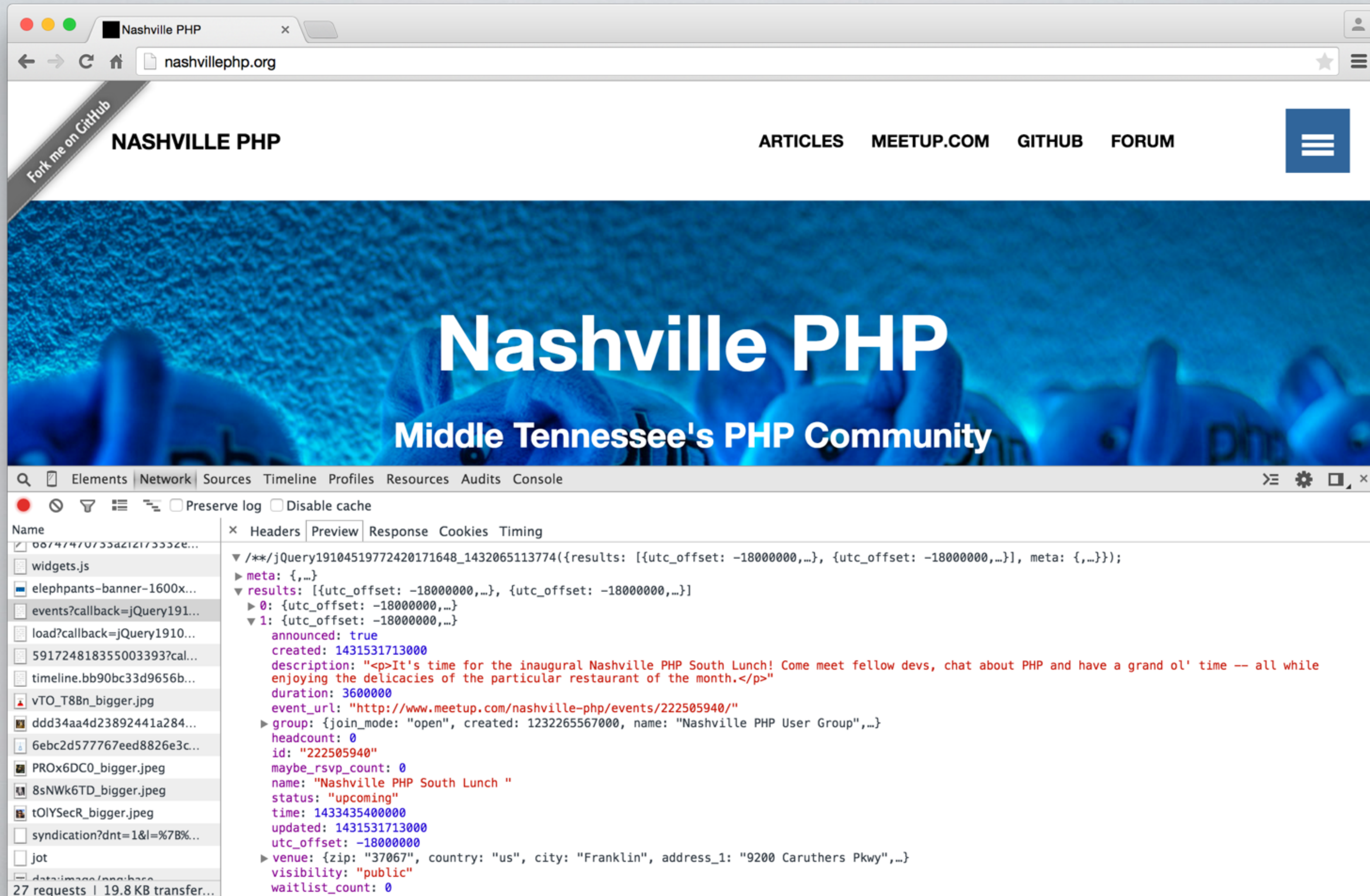
1. User-friendly cURL replacement
2. Lots of great features
3. Sessions/cookie management
4. <httpie.org>

```
2. ramsey@luthien: ~ (zsh)
ramsey at luthien in ~ (php-5.6.8)
$ http GET example.org:8000/contacts?page=43
HTTP/1.1 200 OK
Connection: close
Content-Type: application/hal+json
Host: example.org:8000
X-Powered-By: PHP/5.6.8

{
  "_embedded": {
    "contact": [
      {
        "_links": {
          "self": {
            "href": "/contacts/43"
          }
        },
        "address": "1048 Main St",
        "city": "Fairbanks",
        "company_name": "Rapid Trading Intl",
        "county": "Fairbanks North Star",
        "email": "roxane@hotmail.com",
        "first_name": "Roxane",
        "last_name": "Campain",
        "phone1": "907-231-4722",
        "phone2": "907-335-6568",
        "state": "AK",
        "web": "http://www.rapidtradingintl.com",
        "zip": "99708"
      }
    ]
  }
}
```

# Browser Dev Toolbars

1. All major browsers have them
2. Inspect web requests as they fire in the background
3. See all headers, cookies, & data



# Charles

1. HTTP proxy
2. Essential tool for me
3. Ability to record, modify, and play requests
4. [www.charlesproxy.com](http://www.charlesproxy.com)

Charles 3.10.1 - Session 1

StructureSequence

http://nashvillephp.org

css

main.css

js

vendor

jquery-1.9.1.min.js

moment.min.js

community.js

main.js

images

elephpants-banner-1600x800.jpg

<default>

https://api.meetup.com

2

events?callback=jQuery1910849

OverviewRequestResponseSummaryChartNotes

|                  |         |                                               |
|------------------|---------|-----------------------------------------------|
| results          | Array   |                                               |
| [0]              | Object  |                                               |
| [1]              | Object  |                                               |
| utc_offset       | Integer | -18000000                                     |
| venue            | Object  |                                               |
| headcount        | Integer | 0                                             |
| visibility       | String  | public                                        |
| waitlist_count   | Integer | 0                                             |
| created          | Number  | 1431531713000                                 |
| maybe_rsvp_count | Integer | 0                                             |
| description      | String  | <p>It's time for the inaugural Nashville P... |
| event_url        | String  | http://www.meetup.com/nashville-php/ev...     |
| yes_rsvp_count   | Integer | 17                                            |
| duration         | Integer | 3600000                                       |
| announced        | Boolean | true                                          |
| name             | String  | Nashville PHP South Lunch                     |
| id               | String  | 222505940                                     |
| time             | Number  | 1433435400000                                 |
| updated          | Number  | 1431531713000                                 |
| group            | Object  |                                               |
| status           | String  | upcoming                                      |
| meta             | Object  |                                               |
| next             | String  | https://api.meetup.com/2/events?offset=...    |
| method           | String  | Events                                        |
| total_count      | Integer | 20                                            |
| link             | String  | https://api.meetup.com/2/events               |
| count            | Integer | 2                                             |

HexCompressedJavaScriptJSONJSON TextRaw

CONNECT https://helposx.apple.com

# Paw

1. Elegant REST client
2. Sorry, it's Mac only
3. Send request, inspect response
4. PHP+Guzzle code generator
5. [luckymarmot.com/paw](http://luckymarmot.com/paw)

Contacts API — Edited

Sent My API (2) 200 OK | 16 ms

Cookies

Environments 1 »

My API

GET http://example.org:8000/contacts...

200 OK

My API (2)

GET http://example.org:8000/contacts/...

200 OK

GET http://example.org:8000/contacts?page=14

Headers

URL Params

Body

Options

Timeout

No timeout

second(s)

Redirections

Follow Redirects

Redirect Authorization

Redirect Original Method

Cookies

Automatically Send Cookies

Store Received Cookies

Authorization

Set HTTP Basic Auth

Set OAuth 1

Set OAuth 2

Set Amazon S3 Signature

HTTP

Copy

Export

Open With

1

2

3

4

5

6

GET /contacts?page=14 HTTP/1.1

Host: example.org:8000

Connection: close

User-Agent: Paw/2.2.1 (Macintosh; OS X/10.10.3) GCDHTTPRequest

200 OK

Info

Request

Response

Headers

JSON

Raw

Key or Index

Type

Value

Root

2 items

\_links

3 items

self

1 item

href

/contacts?page=14

next

1 item

href

/contacts?page=15

prev

1 item

\_embedded

1 item

contact

20 items

Index 0

13 items

first\_name

Jade

last\_name

Farrar

company\_name

Bonnet & Daughter

address

6882 Torresdale Ave

city

Columbia

county

Richland

state

SC

zip

29201

phone1

803-352-5387

phone2

803-975-3405

email

jade.farrar@yahoo.com

web

http://www.bonnetdaughter.com

\_links

1 item

self

1 item

href

/contacts/261

Index 1

13 items

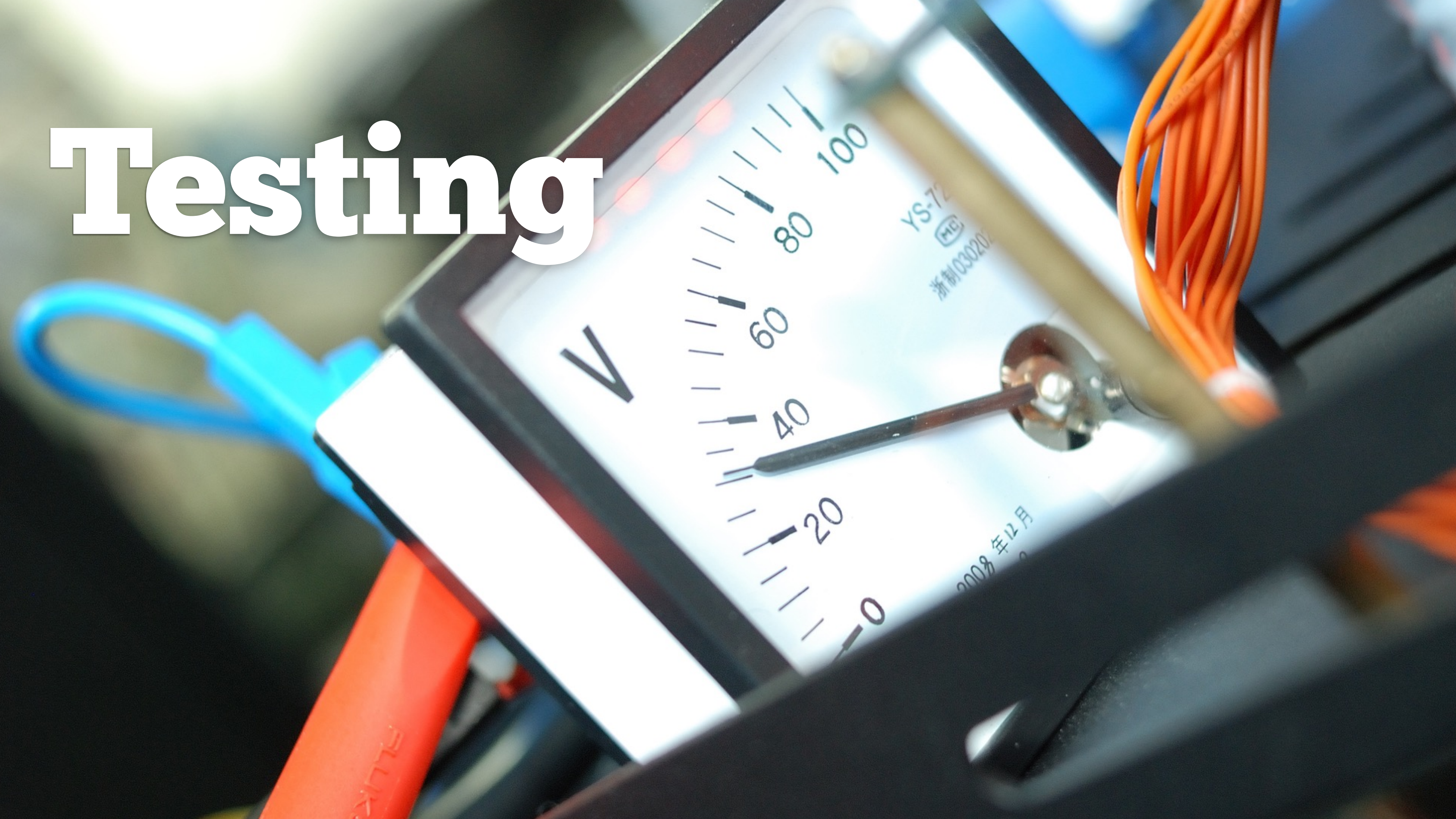
Index 2

13 items

# Runscope Community Projects

1. [hurl.it](https://hurl.it)
2. [requestb.in](https://requestb.in)
3. [httpbin.org](https://httpbin.org)

# Testing



# Frisby.js

1. REST API testing framework
2. Built on node.js and Jasmine
3. Write tests in JavaScript
4. Created by Vance Lucas
5. [frisbyjs.com](http://frisbyjs.com)

```
var frisby = require('frisby');

frisby.create('Contact Not Found')
  .get('http://example.org/contacts/501')
  .expectStatus(404)
  .expectHeaderContains('content-type', 'application/vnd.error+json')
  .expectJSON({
    message: "Contact not found"
  })
  .expectJSONTypes({
    "_links": {
      help: {
        href: String,
        title: String
      }
    }
  })
  .toss();
```

```
frisby.create('Get Contact')
  .get('http://example.org/contacts/43')
  .expectStatus(200)
  .expectHeaderContains('content-type', 'application/hal+json')
  .expectJSON({
    "_links": {
      self: {
        href: "/contacts/43"
      }
    }
  })
  .expectJSONTypes({
    address: String, city: String, company_name: String, county: String,
    email: String, first_name: String, last_name: String, phone1: String,
    phone2: String, state: String, web: String, zip: String
  })
  .toss();
```

```
$ ./node_modules/jasmine-node/bin/jasmine-node tests/spec  
..
```

```
Finished in 0.077 seconds  
2 tests, 20 assertions, 0 failures, 0 skipped
```

# DREDD



No More Outdated  
API Documentation

# Dredd

1. Open source project by Apiary
2. Uses API Blueprint to test your API
3. Ensures your docs are not outdated
4. [github.com/apiaryio/dredd](https://github.com/apiaryio/dredd)

```
$ ./node_modules/dredd/bin/dredd
```

```
Configuration dredd.yml found, ignoring other arguments.
```

```
Starting server with command: php -S 0.0.0.0:8000 index.php
```

```
Waiting 3 seconds for server command to start...
```

```
info: Beginning Dredd testing...
```

```
pass: GET /contacts/42 duration: 46ms
```

```
pass: GET /contacts duration: 113ms
```

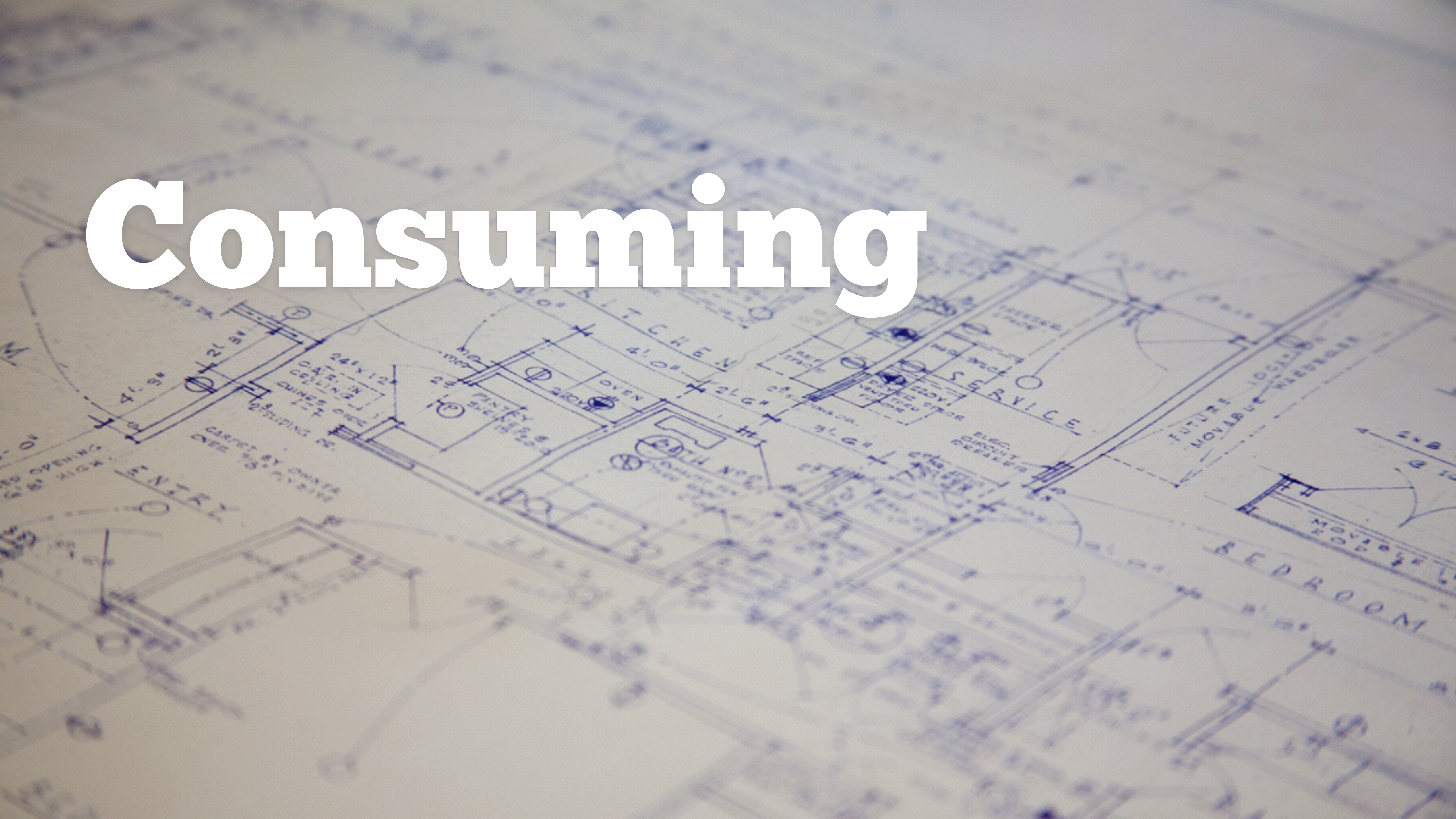
```
complete: 2 passing, 0 failing, 0 errors, 0 skipped, 2 total
```

```
complete: Tests took 163ms
```

# Gavel

1. Another OSS project by Apiary
2. BDD testing for APIs
3. Specify expectations and compare to responses
4. [github.com/apiaryio/gavel](https://github.com/apiaryio/gavel)

# Consuming



# SDKs

1. Most APIs have SDKs, so search

2. If not:

- [php.net/curl](http://php.net/curl)
- [Guzzle](#)

Right now, Guzzle is the best tool we have in PHP to consume APIs.

So, use it if there's no SDK.

**Fin.**





**[bram.se/tek-toolbox-code](https://bram.se/tek-toolbox-code)**



## THANK YOU. ANY QUESTIONS?

If you want to talk more, feel free to contact me.



[joinind.in/13746](https://joinind.in/13746)



[benramsey.com](http://benramsey.com)



[@ramsey](https://twitter.com/ramsey)



[github.com/ramsey](https://github.com/ramsey)



[ben@benramsey.com](mailto:ben@benramsey.com)

This presentation was created using Keynote. The text is set in Chunk Five and Helvetica Neue. The source code is set in Ubuntu Mono. The iconography is provided by Font Awesome.

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Ramsey, Ben. "A Toolbox for APIs and Integrations" php[tek]. Sheraton Chicago O'Hare Airport Hotel, Rosemont, IL. 21 May 2015. Conference presentation.



1



4



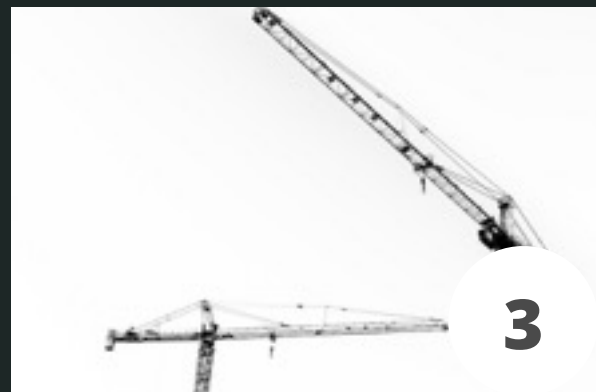
7



2



5



3



6

## PHOTO CREDITS

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