Pragmatical REST

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Hi, I’m Toby!

Qafoo

passion for software quality

REST?

There is no REST

Choose your degree of RESTfulness

Constraints by Example

- Time & money
- Project environment
- Consumers
- API weight
- Architecture requirements
  - Scalability
  - Simplicity
  - Backwards compatibility
  - . . .

Example Scenarios

- Project Internal
  - Image processing
  - Mobile
  - Central account service
- SAAS API
  - Your Flickr clone
  - Tideways (`http://tideways.io`)
- Enterprise Environment
  - Global logistics
  - Financial institution

Disclaimer!

The examples used in this talk will **never** fit your individual project exactly. Do not apply the opinionated ratings provided by the speaker to your project directly. Instead, please weight your own trade-offs. Thanks.

Outline

Basics

HATEOAS

Versioning

Caching

Authentication

Conclusion

Resources

- Entities or collections
- Tree structure
- URI as **unique** identifier
- Examples:
  - `http://plan.qafoo.com/users`
  - `/users/toby`
  - `//jobs/23`
  - `../`

Evaluation: How much REST?

- Project Internal ++
- SAAS API ++
- Enterprise Environment ++

HTTP Methods

- GET
- HEAD
- OPTIONS
- TRACE
- POST
- PUT
- DELETE
- . . .

Evaluation: How much REST?

Project Internal	+	(GET/POST)
SAAS API	++	
Enterprise Environment	++	

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Media Types

- Assign Semantic
- Drive Application State

```
application/psr.com.qafoo.plan-job+xml; charset=UTF-8
```

HATEOAS

```
GET /job/23
```

```
<?xml version="1.0"?>
<job xmlns="urn:psr.com.qafoo.plan-job"
     xmlns:atom="http://www.w3.org/2005/Atom">
     <!-- ... -->
     <atom:link rel="urn:psr.com.qafoo.plan-job-assignments"
          type="application/psr.com.qafoo.plan-job-assignment-list+xml"
          href="/jobs/23/assignments" />
</job>
```

```
...
```

```
POST /job/23/assignments
```

```
<?xml version="1.0"?>
<assignment xmlns="urn:psr.com.qafoo.plan-job-assignment"
     xmlns:atom="http://www.w3.org/2005/Atom">
     <atom:link rel="urn:psr.com.qafoo.plan-assignee"
          type="application/psr.com.qafoo.plan-user+xml"
          href="/users/benjamin" />
     <days>2</days>
</assignment>
```

Evaluation: How much REST?

- Project Internal +/−
- SAAS API +
- Enterprise Environment ++

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Versioning with Media Types

- `application/....plan-job+xml`
- `application/....plan-job-v2+xml`
- `application/....plan-job+xml; version="2"`

Content Negotiation

Accept:

- `application/....plan-job+xml`
- `application/....plan-job+json,`
  `application/....plan-job+xml; q=0.5`
- `application/....plan-job+xml; version="2",`
  `application/....plan-job+xml; q=0.5,`
  `application/*; q=0.2,`
  `*/*; q=0.1`

Evaluation: How much REST?

- Project Internal −
- SAAS API +
- Enterprise Environment +

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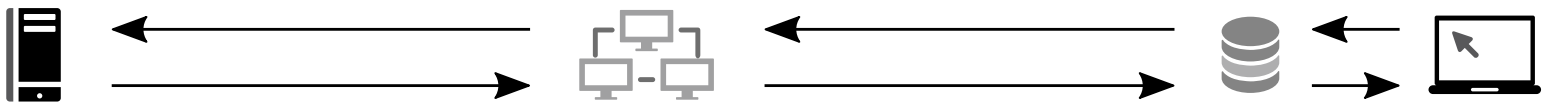
There is no Real-Time

- Given 10 req/sec
- 5 seconds caching
- safes 49 calculations

Caching in HTTP

- Shared
- Private
- Expiration
- Validation



“There are only two hard things in Computer Science: cache invalidation and naming things.” – Phil Karlton

Cachability

- “Sensible defaults”
  - Method (`GET`/`HEAD`)
  - Request headers
  - Response status
- Origin server
  - `Cache-Control`:
    - `public` / `private`
    - `no-cache` / `no-store`
- Client
  - `Cache-Control`:
    - `no-cache` / `no-store`

Expiry

- Origin server
  - `Date:`
  - `Expires:`
  - `Cache-Control:`
    - `max-age=<seconds>`
    - `s-maxage=<seconds>`
- User agent
  - `Cache-Control:`
    - `max-age`
    - `min-fresh`
    - `max-stale`
- Attention: Expiry heuristics

Validation

- Origin server
  - `ETag:`
  - `Last-Modified:`
- Client
  - `If-None-Match:`
  - `If-Modified-Since:`
- Optimistic locking!

Caching . . .

- Even more complicated . . .
  - forced re-validation
  - range caching
  - `Vary`
  - stale handling
  - `PURGE` method
- Be aware of eventual consistency

Evaluation: How much REST?

- Project Internal −
- SAAS API ++
- Enterprise Environment +

Outline

Basics

HATEOAS

Versioning

Caching

Authentication

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Statelessness

- REST = stateless
- All information must be in request

HTTP Workflow

- → `POST /jobs` without auth
- ← `401 Unauthorized` with `WWW-Authenticate`
- → `POST /jobs` with auth for *anonymous*
- ← `401 Unauthorized` with `WWW-Authenticate`
- → `POST /jobs` with auth for *toby*
- ← `201 Created`

Basic / Digest Auth

- HTTP default auth methods
- Basic
  - → Some request
  - ← `WWW-Authenticate: Basic realm="My API"`
  - → `Authorization: Basic dG9ieTpxYWZvbw==`
- Digest
  - Hashing with server provided nounce
  - Slightly more secure (but not enough!)
- Use HTTPS with Basic and Digest!

API Key

- Authenticate an application
- Not a user
  - Shared secret exchange
  - Cryptographic signing
  - `hash_hmac()`
- Custom `WWW-Authenticate` / `Authorization` format
- Use HTTPS with API-key!

API Key: JWS/JWT

- Attempt for standardization
- JSON Web Signature `http://qa.fo/jws`
- JSON Web Token `http://qa.fo/jwt`

OAuth2

- Authenticate users 3rd party apps
  - e.g. Twitter / Facebook / . . .
- Allows fine-grained permission system
  - Read personal information
  - Read friend list
  - Post as user
  - . . .
- `http://oauth.net/2/`
- OAuth2 requires HTTPS!

Evaluation: How much REST?

Project Internal	++	API key / Digest
SAAS API	++	OAuth / API Key
Enterprise Environment	++	API Key

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There is no REST

- There is no (pure) REST
- You must make **trade-offs**

  `http://qa.fo/trade-offs`
- Decide wisely
  - REST architecture attributes
  - Project scope
  - Consumers
  - . . .
- Questions?

THANK YOU

Rent a quality expert
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