A Pragmatic Introduction to REST

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Audience Poll

How many of you make money doing Rails?

Percentage of Rails users developing RESTfully?

How many are just learning Ruby/Rails?

How many want to learn what REST is about?

How many know REST and want to see where I'm wrong?

What is REST?

3 definitions

REST: An Architectural Style

One of a number of "architectural styles"

... described by Roy Fielding in his dissertation

... defined via a set of *constraints* that have to be met

... architectural principles underlying HTTP, defined *a posteriori*

... with the Web as one particular instance

See: http://www.ics.uci.edu/~fielding/pubs/dissertation/top.htm

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REST: The Web Used Correctly

A system or application architecture

... that uses HTTP, URI and other Web standards "correctly"

... is "on" the Web, not tunneled through it

... also called "WOA", "ROA", "RESTful HTTP"

3

REST: XML without SOAP

Send plain XML (w/o a SOAP Envelope) via HTTP

... violating the Web as much as WS-*

... preferably use GET to invoke methods

... or tunnel everything through POST

... commonly called “POX”

Only option 1 is the right one
(because Roy said so)

But we'll go with option 2
(and equate "REST" with
"RESTful HTTP usage")

and avoid option 3 like the plague

REST Explained in 5 Easy Steps

1. Give Every “Thing” an ID

http://example.com/customers/1234

http://example.com/orders/2007/10/776654

http://example.com/products/4554

http://example.com/processes/sal-increase-234

2. Link Things To Each Other

```
<order self='http://example.com/orders/1234'>
  <amount>23</amount>
  <product ref='http://example.com/products/4554' />
  <customer ref='http://example.com/customers/1234' />
</order>
```

3. Use Standard Methods

GET	retrieve information, possibly cached
PUT	Update or create with known ID
POST	Create or append sub-resource
DELETE	(Logically) remove

4. Allow for Multiple "Representations"

```
GET /customers/1234
Host: example.com
Accept: application/vnd.mycompany.customer+xml

<customer>...</customer>
```

```
GET /customers/1234
Host: example.com
Accept: text/x-vcard

begin:vcard
...
end:vcard
```

5. Communicate Statelessly

```
GET /customers/1234
Host: example.com
Accept: application/vnd.mycompany.customer+xml
```

```
<customer><order ref='./orders/46'</customer>
```

shutdown

update software

replace hardware

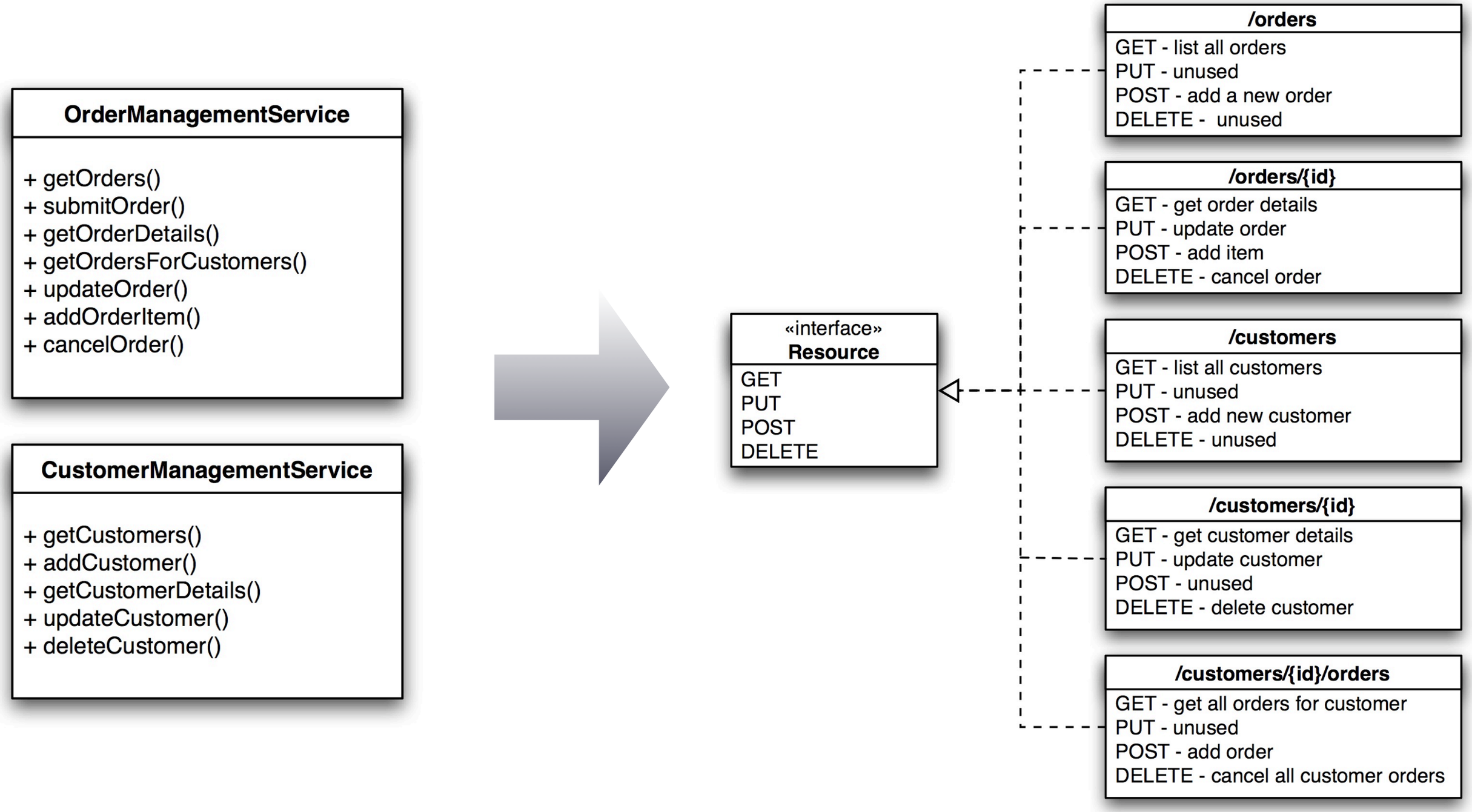
startup

```
GET /customers/1234/orders/46
Host: example.com
Accept: application/vnd.mycompany.order+xml
```

```
<order>...</order>
```

time

Consequences

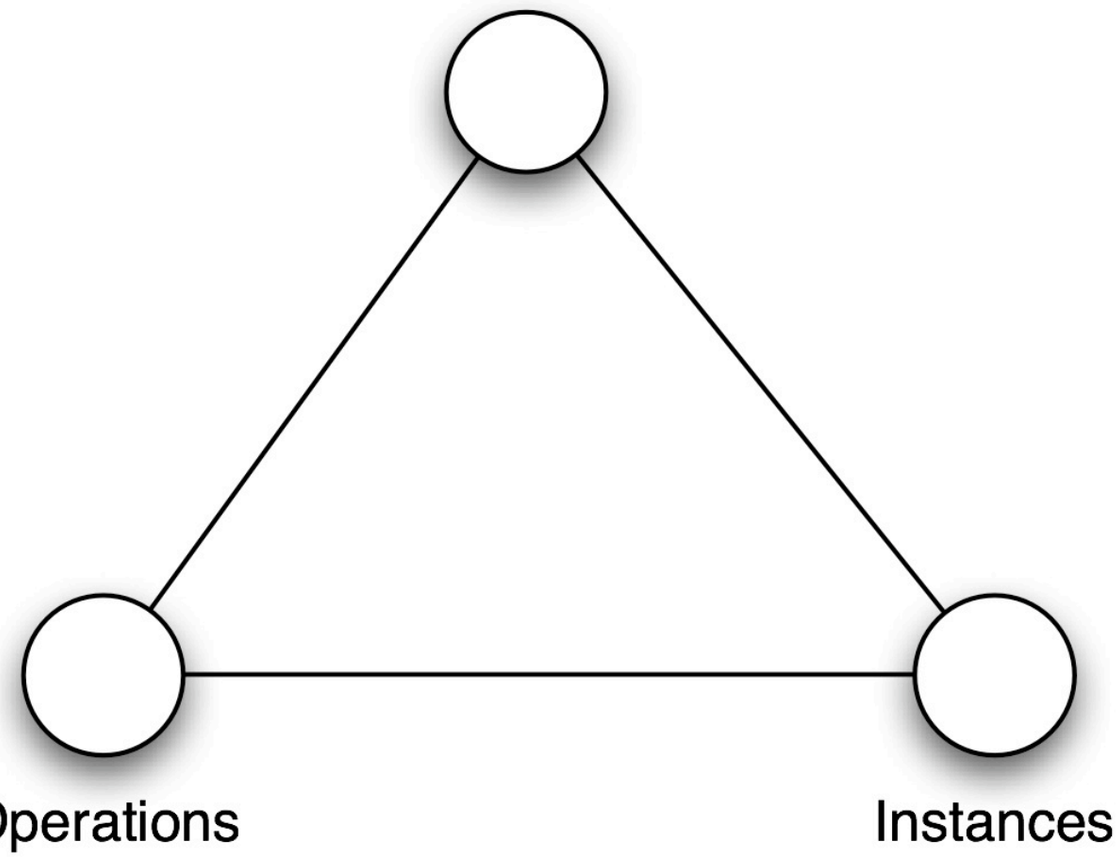

OrderManagementService
+ getOrders()
+ submitOrder()
+ getOrderDetails()
+ getOrdersForCustomers()
+ updateOrder()
+ addOrderItem()
+ cancelOrder()
CustomerManagementService
+ getCustomers()
+ addCustomer()
+ getCustomerDetails()
+ updateCustomer()
+ deleteCustomer()
«interface»
Resource
GET
PUT
POST
DELETE
/orders
GET - list all orders
PUT - unused
POST - add a new order
DELETE - unused
/orders/{id}
GET - get order details
PUT - update order
POST - add item
DELETE - cancel order
/customers
GET - list all customers
PUT - unused
POST - add new customer
DELETE - unused
/customers/{id}
GET - get customer details
PUT - update customer
POST - unused
DELETE - delete customer
/customers/{id}/orders
GET - get all orders for customer
PUT - unused
POST - add order
DELETE - cancel all customer orders

Cheating?

Maybe.

many

Data types



many

very few

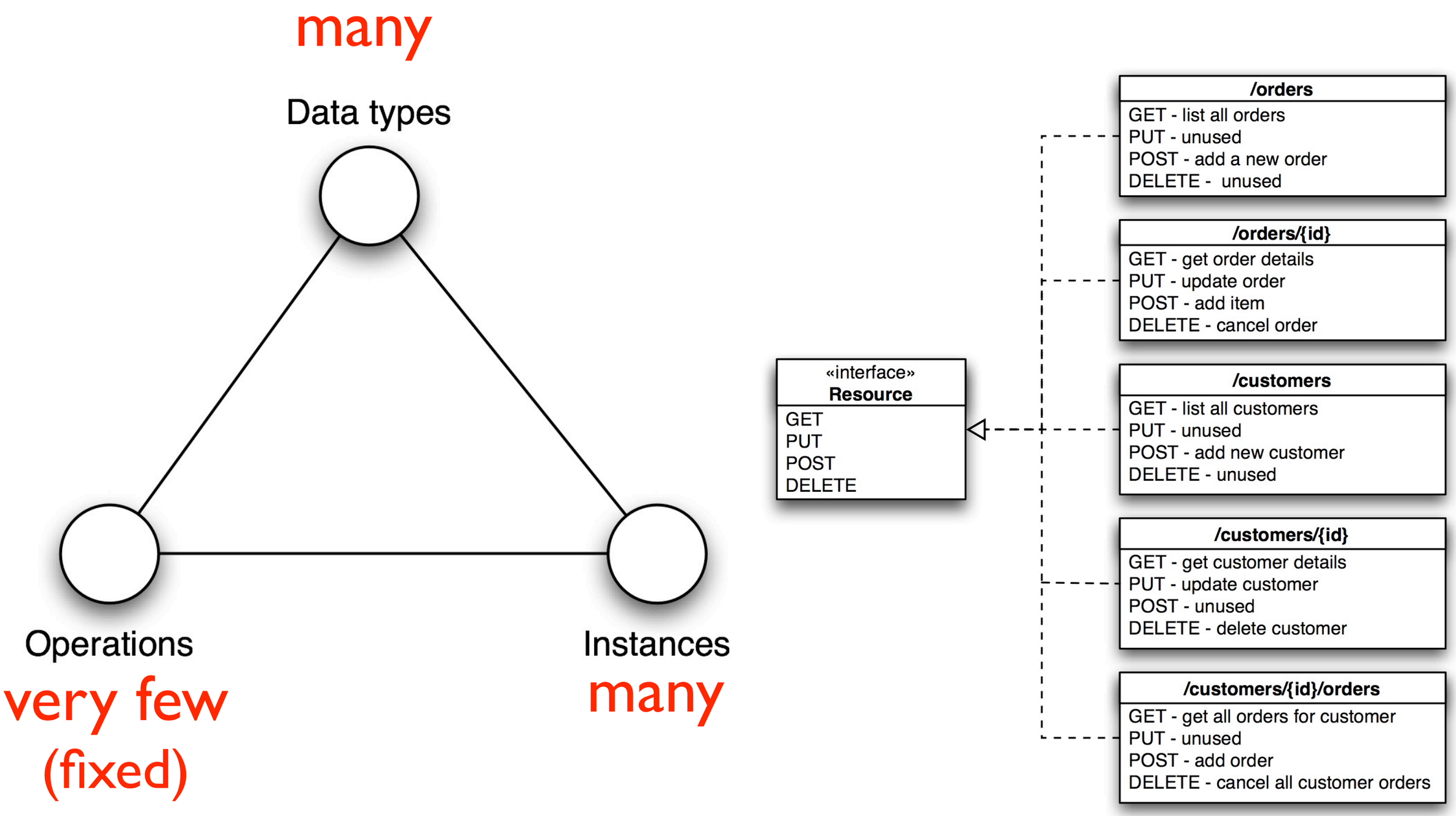
(one per service)

OrderManagementService

+ getOrders()
+ submitOrder()
+ getOrderDetails()
+ getOrdersForCustomers()
+ updateOrder()
+ addOrderItem()
+ cancelOrder()

CustomerManagementService

+ getCustomers()
+ addCustomer()
+ getCustomerDetails()
+ updateCustomer()
+ deleteCustomer()


many
Data types
Operations
very few
(fixed)
Instances
many
«interface»
Resource
GET
PUT
POST
DELETE
/orders
GET - list all orders
PUT - unused
POST - add a new order
DELETE - unused
/orders/{id}
GET - get order details
PUT - update order
POST - add item
DELETE - cancel order
/customers
GET - list all customers
PUT - unused
POST - add new customer
DELETE - unused
/customers/{id}
GET - get customer details
PUT - update customer
POST - unused
DELETE - delete customer
/customers/{id}/orders
GET - get all orders for customer
PUT - unused
POST - add order
DELETE - cancel all customer orders

Designing a RESTful Application

Identify resources & design URIs

Select formats (or create new ones)

Identify method semantics

Select response codes

See: http://bitworking.org/news/How_to_create_a_REST_Protocol

What's cool about REST?

A very rough analogy
(in pseudocode)

generic

```
interface Resource {
     Resource(URI u)
     Response get()
     Response post(Request r)
     Response put(Request r)
     Response delete()
}
```

Any HTTP client
(Firefox, IE, curl, wget)

Any HTTP server

Caches

Proxies

Google, Yahoo!, MSN

```
class CustomerCollection : Resource {
     ...
     Response post(Request r) {
          id = createCustomer(r)
          return new Response(201, r)
     }
     ...
}
```

Anything that knows
your app

specific

generic

```
interface Resource {
     ...
}
```

Anything that understands HTTP

```
class AtomFeed : Resource {
     AtomFeed get()
     post(Entry e)
     ...
}
```

Any feed reader

Any AtomPub client

Yahoo! Pipes

```
class CustomerCollection : AtomFeed {
     ...
}
```

Anything that knows your app

specific

Some HTTP Features

Verbs (in order of popularity):

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

Standardized (& meaningful) response codes

Content negotiation

Redirection

Caching (incl. validation/expiry)

Compression

Chunking

RESTful HTTP Advantages

Universal support (programming languages, operating systems, servers, ...)

Proven scalability

Real web integration for machine-2-machine communication

Support for XML, but also other formats

REST and Web Services

(very briefly, I promise)

Web Services Issues

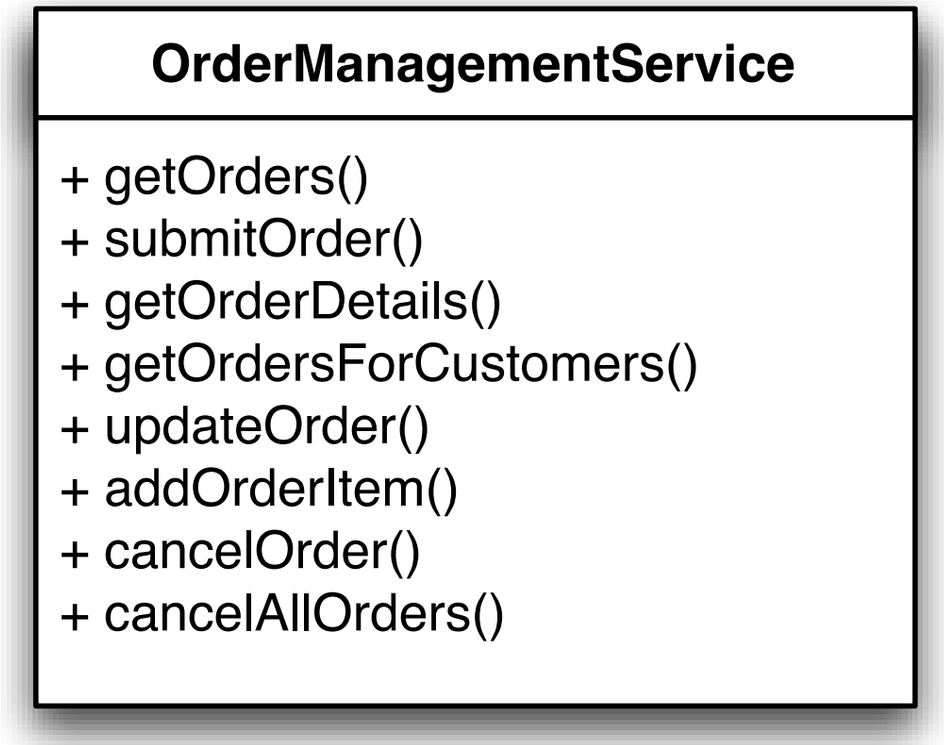
Web Services are "Web" in name only

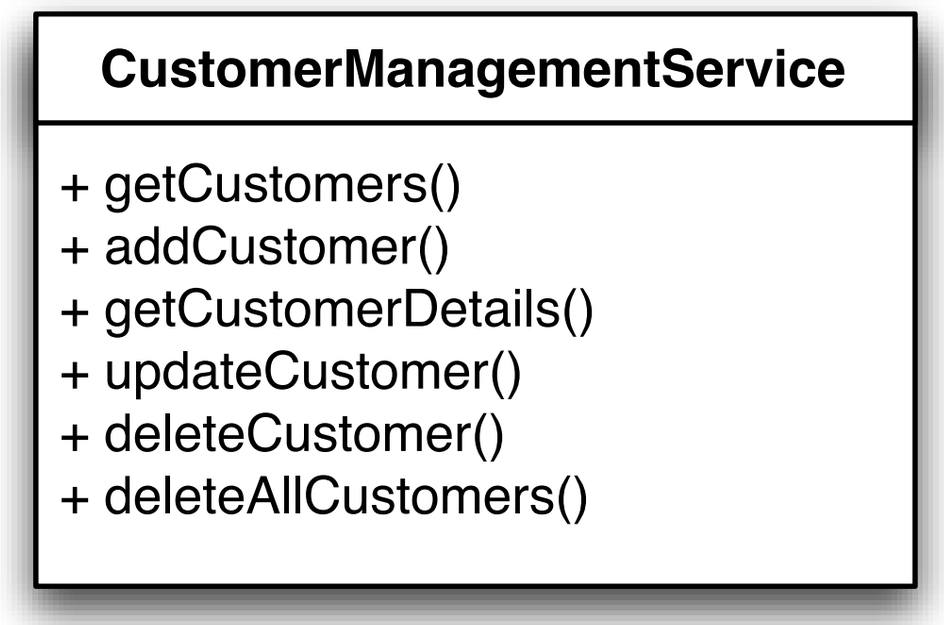
WS-* tends to ignore the web

Abstractions leak, anyway

Protocol independence is a bug, not a feature

Web Services





A separate interface (façade) for each purpose

As known CORBA, DCOM, RMI/EJB

Often used for SOA (“CORBA w/ angle brackets)

Application-specific protocol

Contribution to the Net's Value

2 URLs

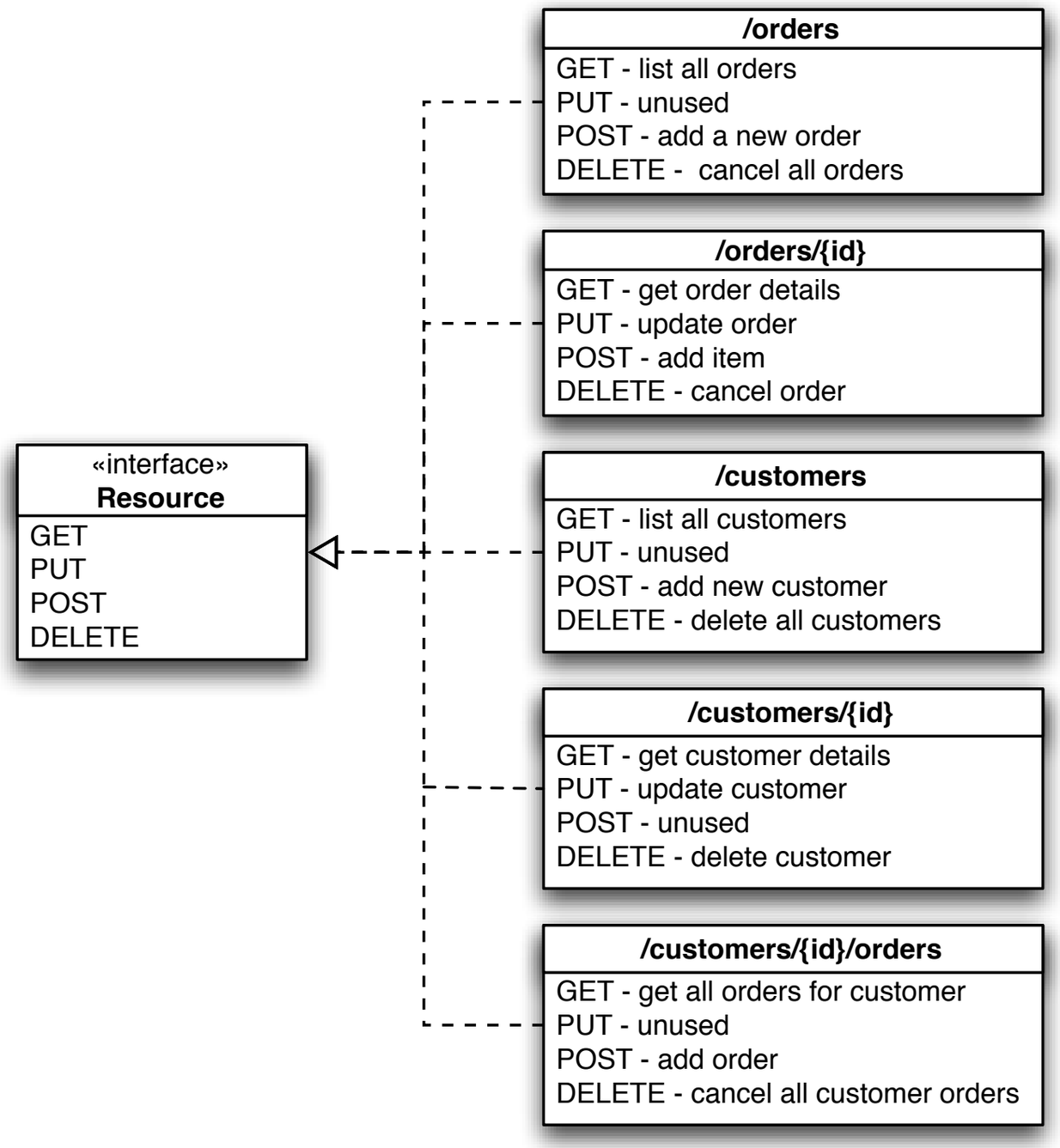
http://example.com/customerservice

http://example.com/orderservice

1 method

POST

REST Approach



A single *generic* (uniform) interface for everything

Generic verbs mapped to resource semantics

A standard application protocol (e.g. HTTP)

Contribution to the Net's Value

Millions of URLs

- every customer
- every order

4-6 supported methods per resource

- GET, PUT, POST, DELETE, OPTIONS, HEAD

Cacheable, addressable, linkable, ...

REST for SOA

Business	SOA as an approach to business/IT alignment	
Architecture	Technical SOA	REST
Technology	SOAP, WSDL, WS-*	(RESTful) HTTP, URI, ...

REST as an alternative way to achieve SOA goals

REST & Rails

Rails < 2.0

```
ActionController::Routing::Routes.draw do |map|
  # ...
  map.connect ':controller/:action/:id'
end
```

http://localhost:3000/demo/read_something?value1=...&value2=...

```
class DemoController < ApplicationController

  def read_something
    # retrieve some result using params[:value1], params[:value2], ...
  end

  def change_something
    # update backend using params[:value1], params[:value2], ...
  end
end
```

Rails < 2.0

Default (incl. scaffolding) unRESTful

URIs identify *actions*

No difference between POST and GET by default

Typical PHP/Java Web programming model

Rails ≥ 2.0

```ruby
ActionController::Routing::Routes.draw do |map|
  map.resources :orders
end
```

```
          orders GET    /orders                    {:controller=>"orders", :action=>"index"}
formatted_orders GET    /orders.:format            {:controller=>"orders", :action=>"index"}
                 POST   /orders                    {:controller=>"orders", :action=>"create"}
                 POST   /orders.:format            {:controller=>"orders", :action=>"create"}
       new_order GET    /orders/new                {:controller=>"orders", :action=>"new"}
 formatted_new_order GET    /orders/new.:format    {:controller=>"orders", :action=>"new"}
      edit_order GET    /orders/:id/edit           {:controller=>"orders", :action=>"edit"}
formatted_edit_order GET    /orders/:id/edit.:format {:controller=>"orders", :action=>"edit"}
           order GET    /orders/:id                {:controller=>"orders", :action=>"show"}
     formatted_order GET    /orders/:id.:format    {:controller=>"orders", :action=>"show"}
                 PUT    /orders/:id                {:controller=>"orders", :action=>"update"}
                 PUT    /orders/:id.:format        {:controller=>"orders", :action=>"update"}
                 DELETE /orders/:id                {:controller=>"orders", :action=>"destroy"}
                 DELETE /orders/:id.:format        {:controller=>"orders", :action=>"destroy"}
```

Demo

How RESTful is Rails?

Positive:

Consistent and clean CRUD mapping

Use of URIs for resource identification

Support for content negotiation

Reasonable Status codes

ETags (!)

How RESTful is Rails?

Negative:

No hypermedia

No deep ETags

CRUD-centric

Proprietary protocol for ActiveResource

My Rails/REST Wishlist

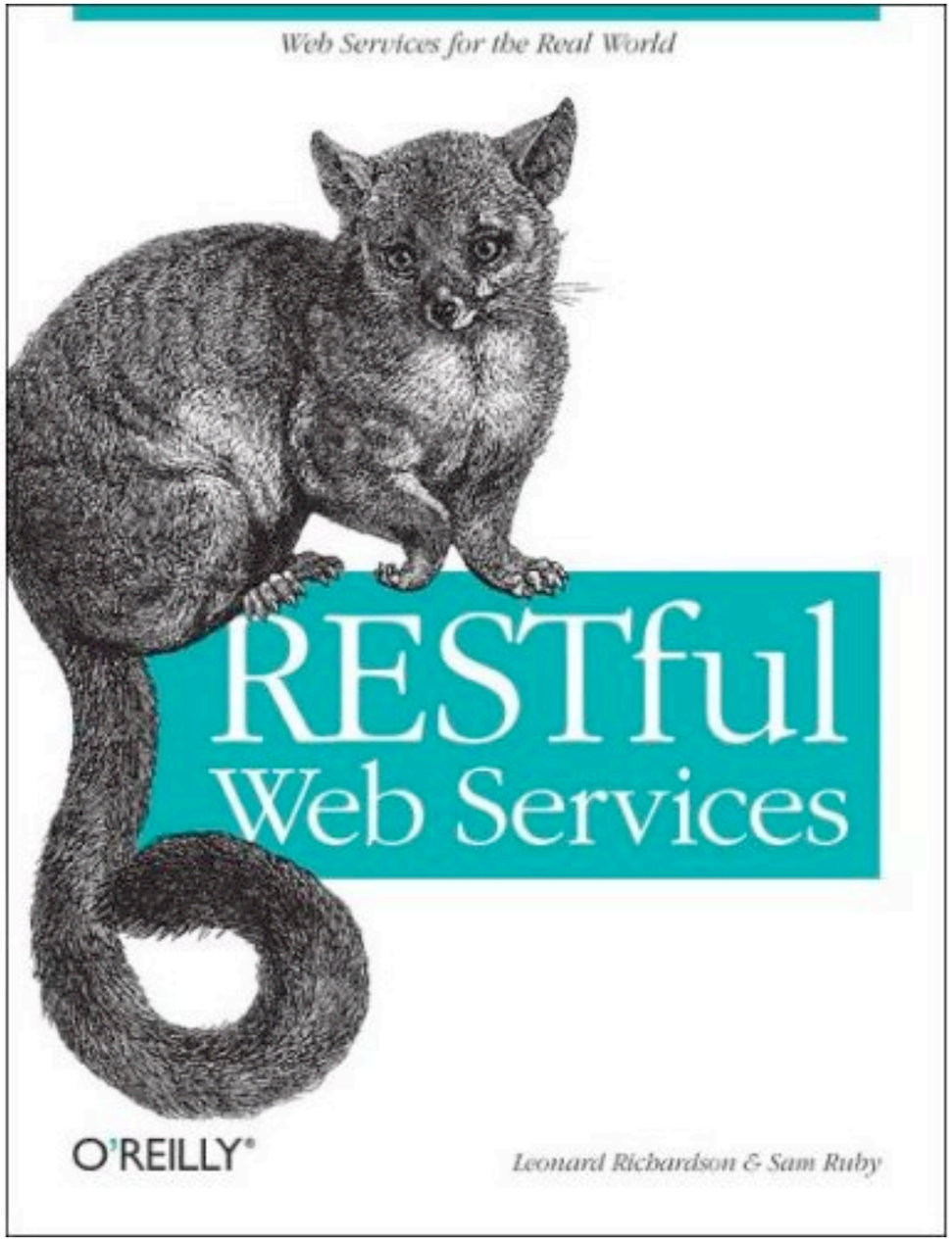
A really cool, meta-driven hypermedia programming model

for both client and server (w/o coupling)

Atom Syndication and Atom Pub Support

If You Want to Know More

http://www.innoq.com/resources/REST



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Architecture Evaluation in

Thank you!

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