Put your systems to REST

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são paulo

11 years old: learned "Basic"

1998 selling dogs

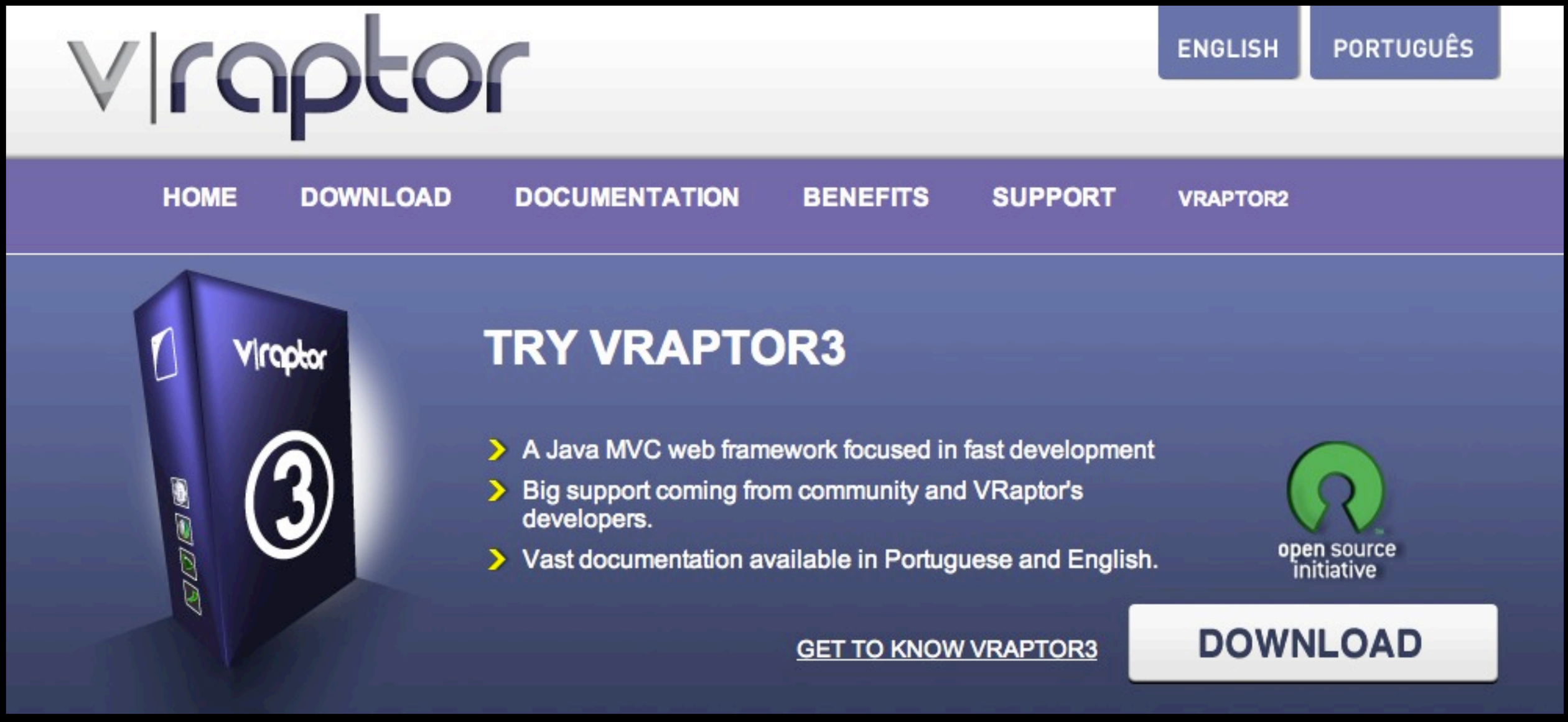
DEAD

www.canilbrasil.com.br

2002 guj.com.br

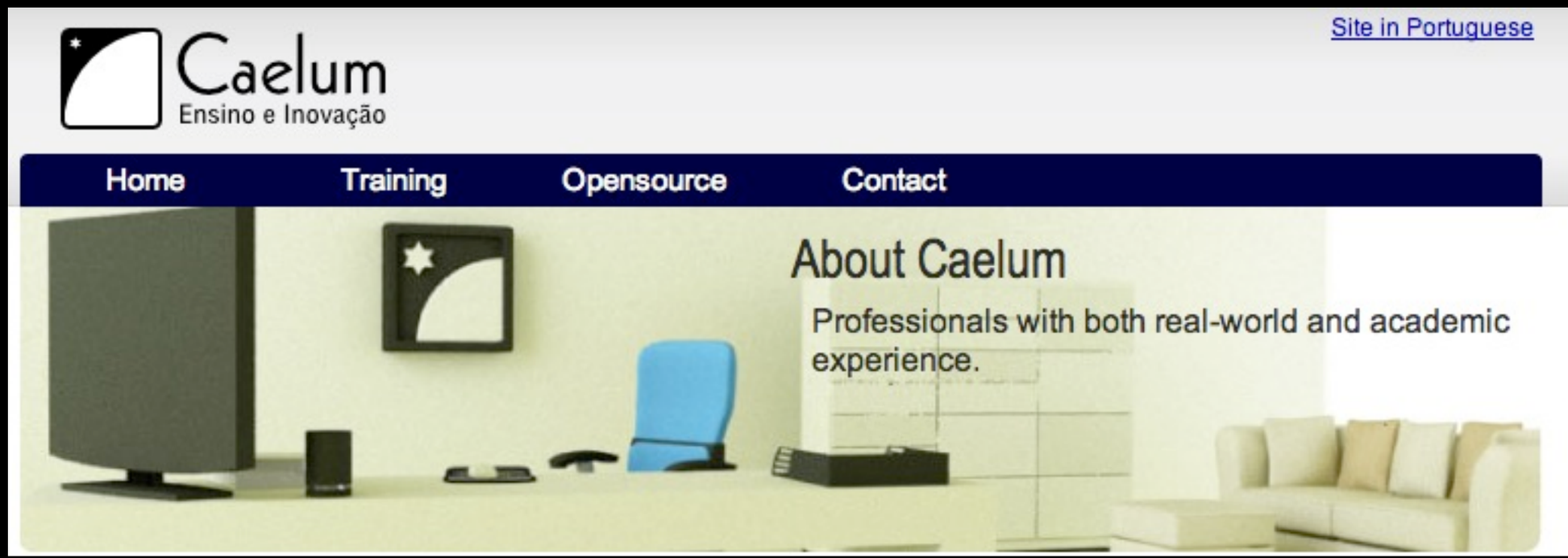
www.guj.com.br

2003 vraptor



www.vraptor.org/en

2004 caelum



www.caelumobjects.com

2004 xstream

xstream.codehaus.org

2004 extreme programming

2006 scrum

Scrum (development)

From Wikipedia, the free encyclopedia

Scrum is an iterative, incremental methodology for project management often seen in agile software development.

Although Scrum was intended for management of software development projects, it can be used to run software maintenance teams, or as a general project/program management approach.

http://en.wikipedia.org/wiki/Scrum_(development)

2009 restfulie

http://restfulie.caelumobjects.com/

2009 lean

Lean software development

From Wikipedia, the free encyclopedia

This article **needs additional citations for verification.**

Please help improve this article by adding reliable references. Unsourced material may be challenged and rem

It has been suggested that this article or section be merged into *Lean IT*. (Discuss)

Lean software development is a translation of Lean manufacturing and Lean IT principles and practices to the software development domain. Adapted from the Toyota Production System, a pro-lean subculture is emerging from within the Agile community.

http://en.wikipedia.org/wiki/Lean_software_development

2010 tectura

http://www.tectura.com.br

qcon 2010 são paulo, brazil

daily life

http://www.caelum.com.br

http://www.caelumobjects.com

blogs

blog.caelumobjects.com

blog.caelum.com.br

agilenomundoreal.com.br

bank.com calendar.com

$$\int_a^b bank + travel + calendar + company$$

travel.com company.com

CORBA

heaven?

EJB

heaven?

SOAP

heaven?


Topázio
Coco
CONTÉM 5 UNIDADES DE 100g
PESO LÍQUIDO 500g
INDÚSTRIA BRASILEIRA
VÁLIDO ATÉ: OUT/2010
Sabão
Neutro
LIMPEZA DELICADA

what is REST?

what is the future
of integration
over the web?

what was REST?

Restful Web

Services

create a saas account

freeze account

reactivate account

Web

http

port 80

firewall heaven

Restful Services

Web Services

xml, json

Restful

get, post, ...

Restful Web Services

as of 2009

But what about Hypermidia?
What about consumers?

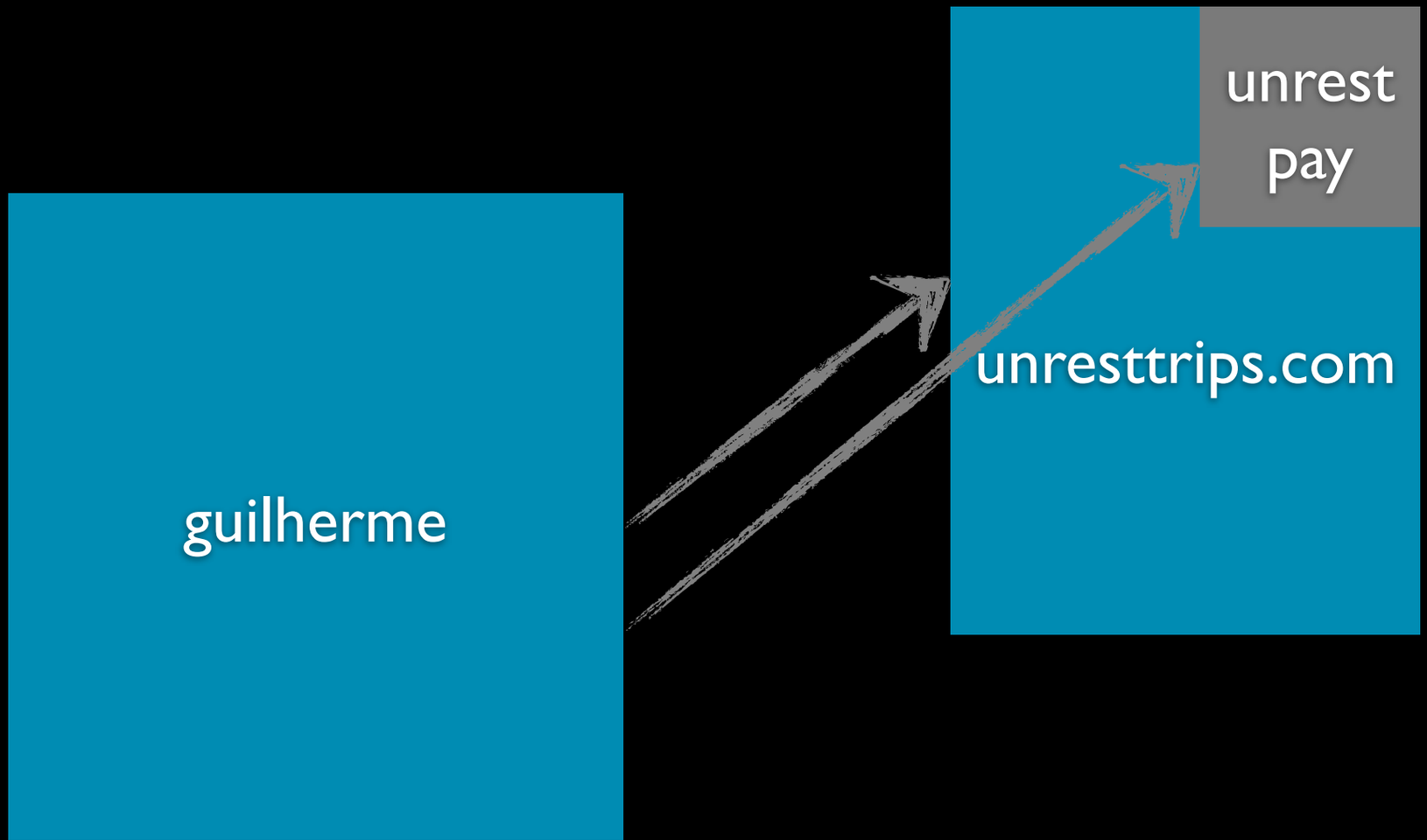
There is much more!

unresttrips.com: flight details

```
<?xml version="1.0" encoding="UTF-8" standalum="yes"?>
<flight>
  <information>
    <from>sao paulo</from>
    <to>seoul</to>
  </information>
  <value>900.00</value>
</flight>
```

service locator when integrating:

coupling++



resttrips.com: flight details

```
<?xml version="1.0" encoding="UTF-8" standalum="yes"?>
<flight>
  <information>
    <from>sao paulo</from>
    <to>seoul</to>
  </information>
  <value>900.00</value>
  <link rel="payment"
        href="http://resttrips.com/payment/custom" />
</flight>
```

resttrips.com: making the payment

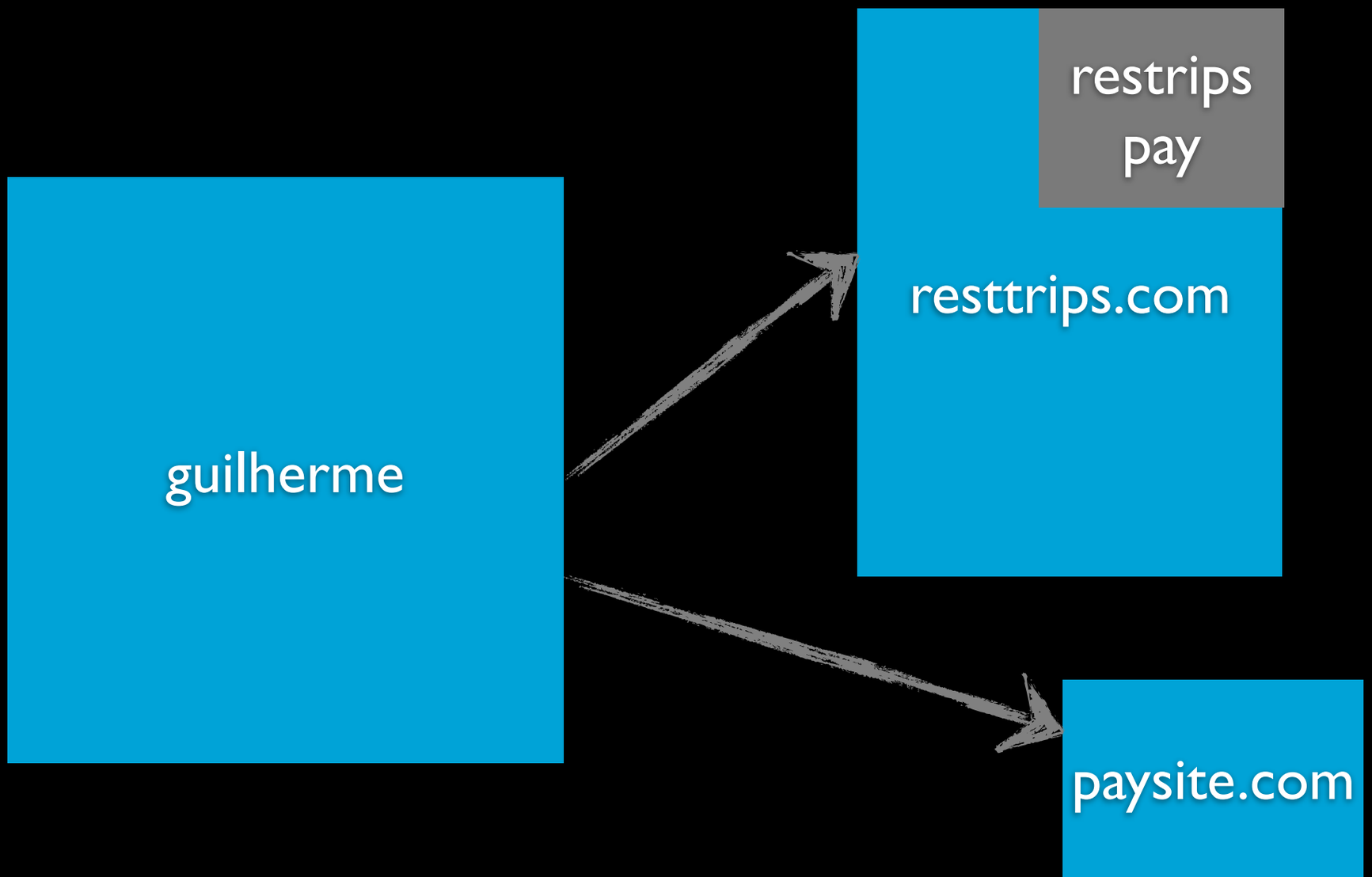
```
flight = Client.at('http://resttrips.com/f/574XR4').get();

confirmation = flight.getLink("payment").
                      patch(cardInformation, value);
```

resttrips.com: changing its payment provider

```
<?xml version="1.0" encoding="UTF-8" standalum="yes"?>
<flight>
  <information>
    <from>sao paulo</from>
    <to>seoul</to>
  </information>
  <value>900.00</value>
  <link rel="payment"
              href="http://paysite.com/custom"/>
</flight>
```

dependency injection when integrating:

coupling--



trip = resource

http://kayak.com/f/574XR4

payment = resource

any_uri_unknown_at_compile_time

http://www.kayak.com/r/M4u1G4

Fri Mar 4 2011 – Tue Mar 8 2011

Toolbox

Change your search

Get a price alert

Stops

nonstop

1 stop $2047

2+ stops $1971

Flight Times

Take-off Landing

Take-off (Depart Flight) show all

Fri 1:00a - Sat 12:00a

ads

Fly to Seoul from $179*

Seoul Fares Just Dropped! Book Now to Lock In the Best Deals.

LowFares.com/Seoul-Fares

566 of 569 roundtrips shown show all « Prev – Next »

Filters Applied: Depart/Return, same airports

Price*	Airline	Takeoff	Landing	Stops (Duration)
$1971 USD Select	Continental	GRU 10:25p	ICN 4:30p	2 (30h 05m)
		ICN 12:15p	GRU 9:55a	2 (33h 40m)
4 sites			save	
$1971 USD Select	Continental	GRU 10:25p	ICN 4:30p	2 (30h 05m)
		ICN 11:30a	GRU 9:55a	2 (34h 25m)
4 sites			save	

i never travel alone

my friend rick

resttrips.com: sharing a trip

```
flight = Client.at('http://resttrips.com/f/574XR4').get();

confirmation = flight.getLink("payment").
                      patch(cardInformation, value/2);

// send the payment link to another part of the web

flight = Client.at('http://resttrips.com/f/574XR4').get();

confirmation = flight.getLink("payment").
                      patch(cardInformation, value/2);
```

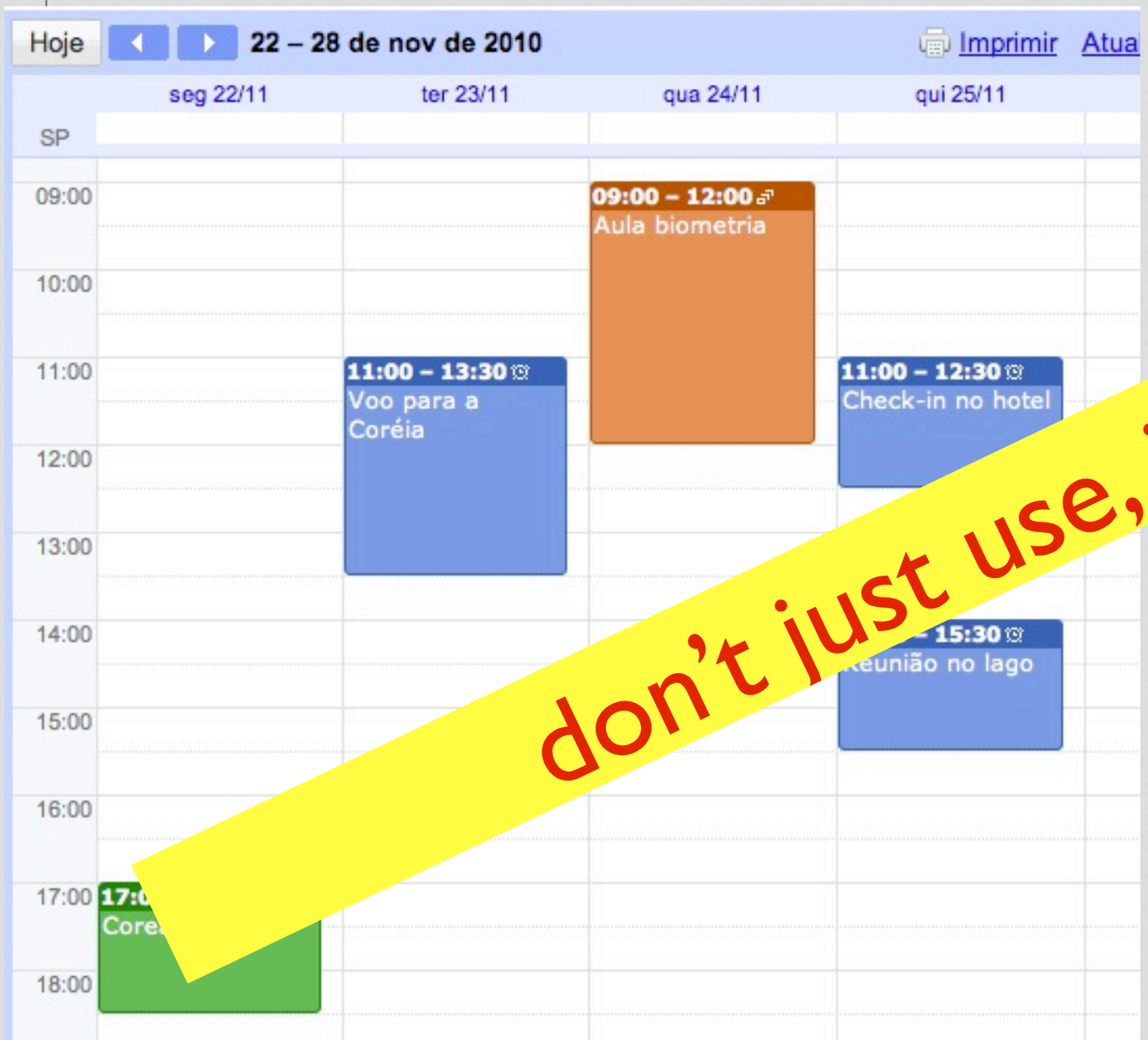
calendar: integrating my systems

```
myself = Client.at('http://users.calendar.com')
                                        .with(auth).get();

myself.link("calendar").patch(flight.link("self"));
```

calendar: more examples

```
me.link("calendar").patch(link_to_birthday_list)
me.link("calendar").patch(link_to_hotel_reservation)
me.link("calendar").patch(link_to_trip_details)
```

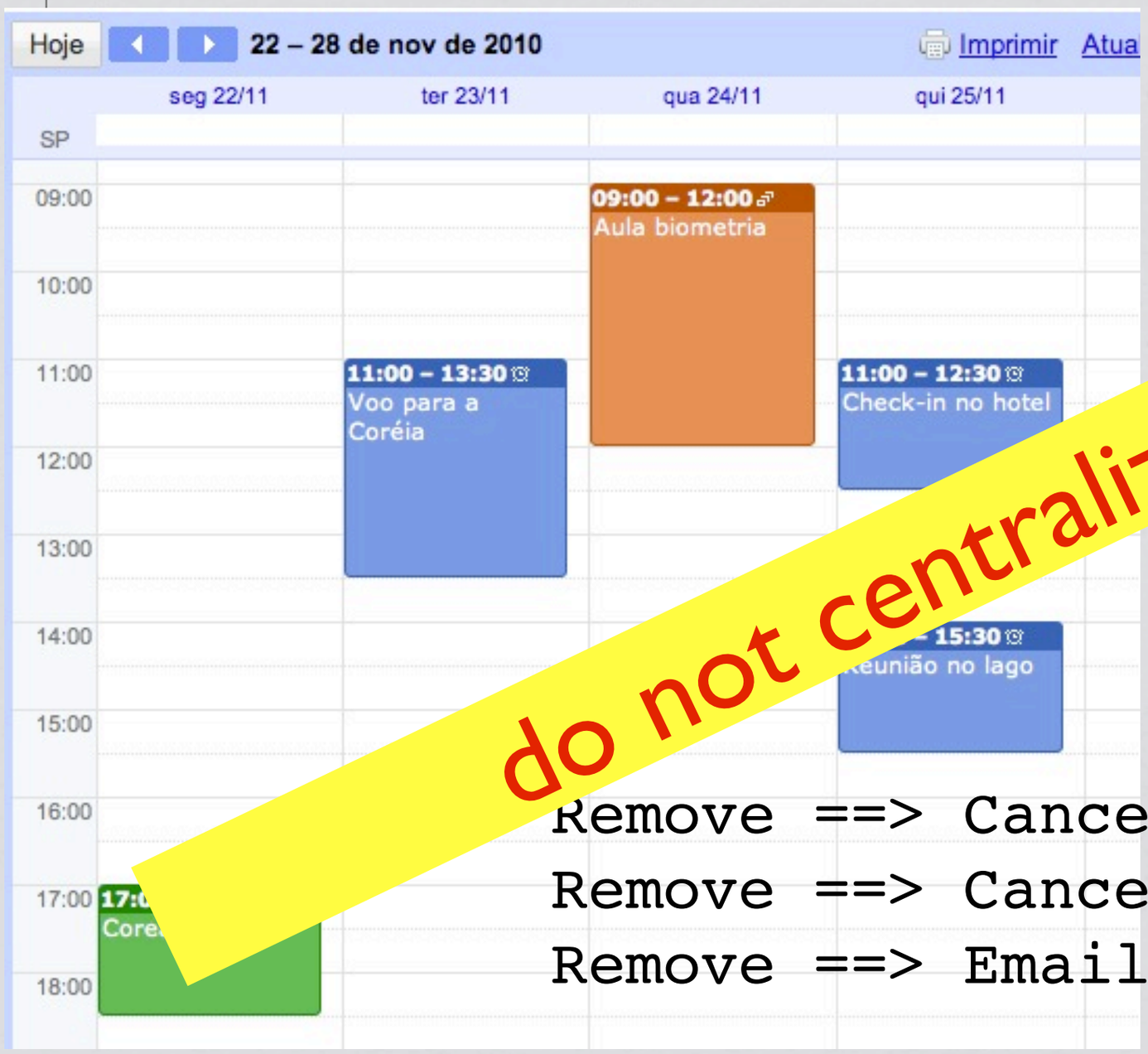
Any update on the flight ==> reflects here
Any update on the hotel ==> reflects here
Any update on the meeting ==> reflects here



don't just use, integrate!

so what?

so what? that was just keeping an URI.



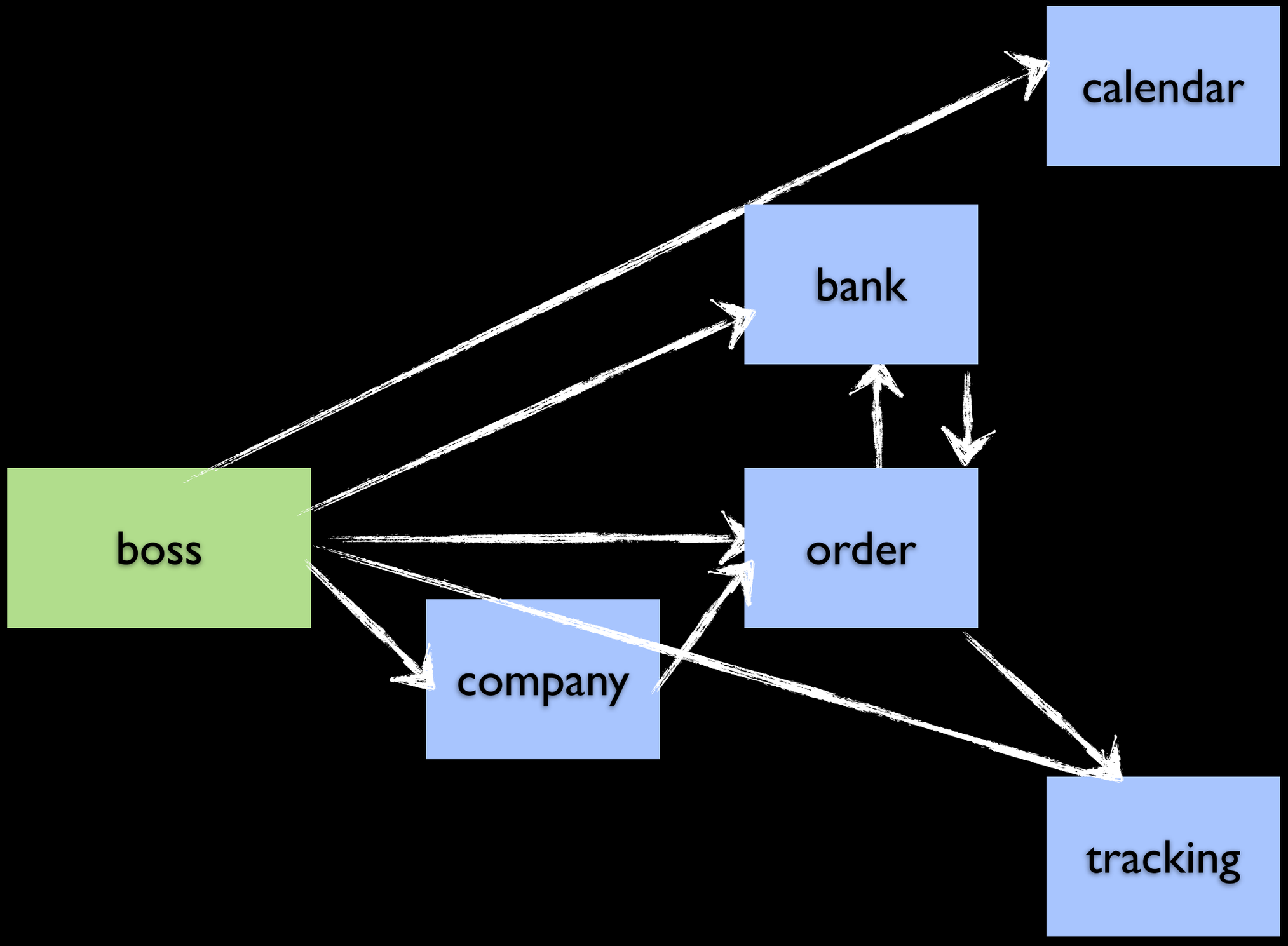
do not centralize control!

```
Remove ==> Cancels the flight
Remove ==> Cancels the reservation
Remove ==> Emails your coworkers
```

integration over the web

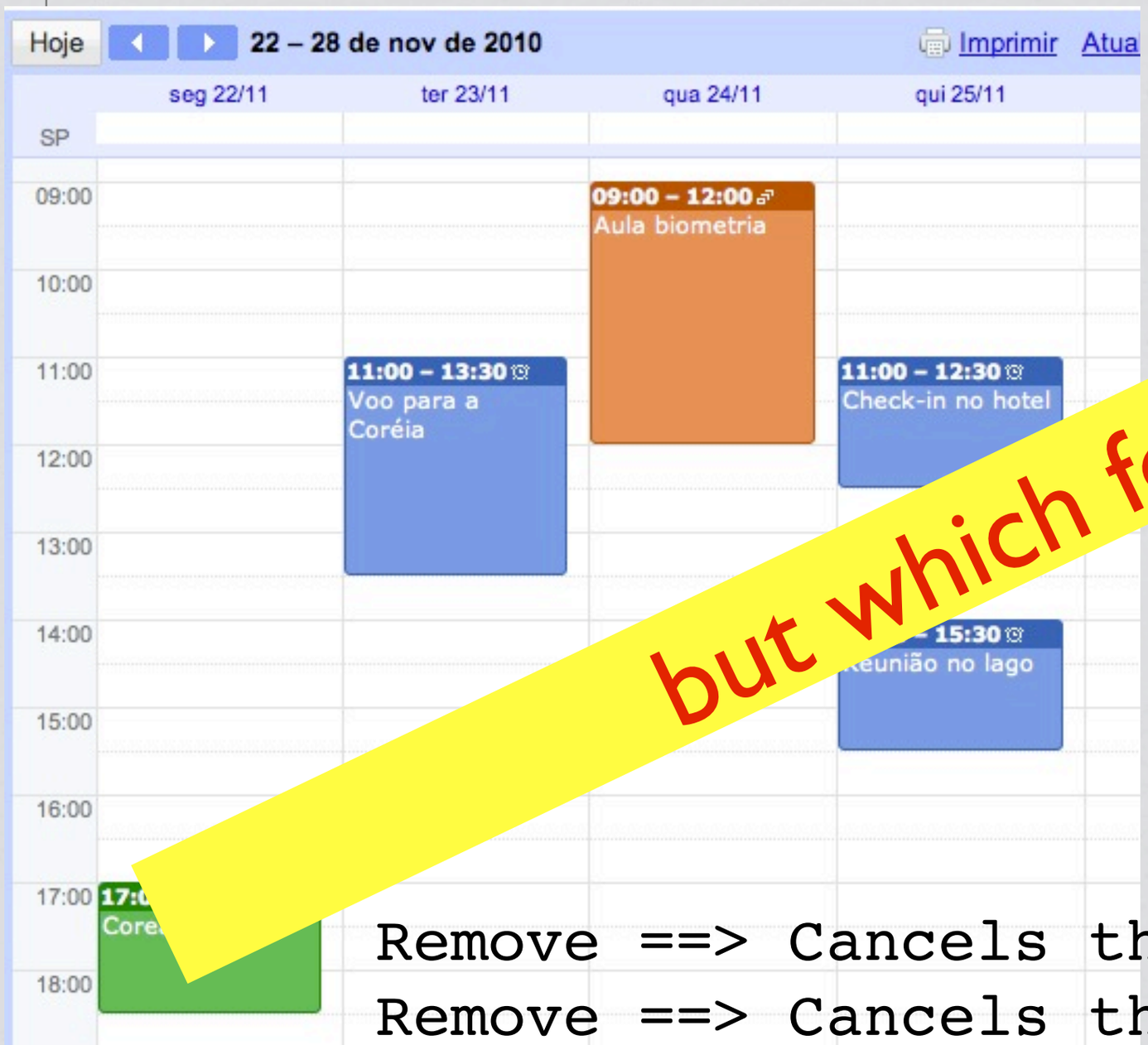
DECENTRALIZING the CONTROL
delegating to multiple agents
distributing your system

integration over the web



does our ‘rest’
systems built in
2010
work this way?

so what? that was just keeping an URI.



but which format?

```
Remove ==> Cancels the flight
Remove ==> Cancels the reservation
Remove ==> Emails your coworkers
```

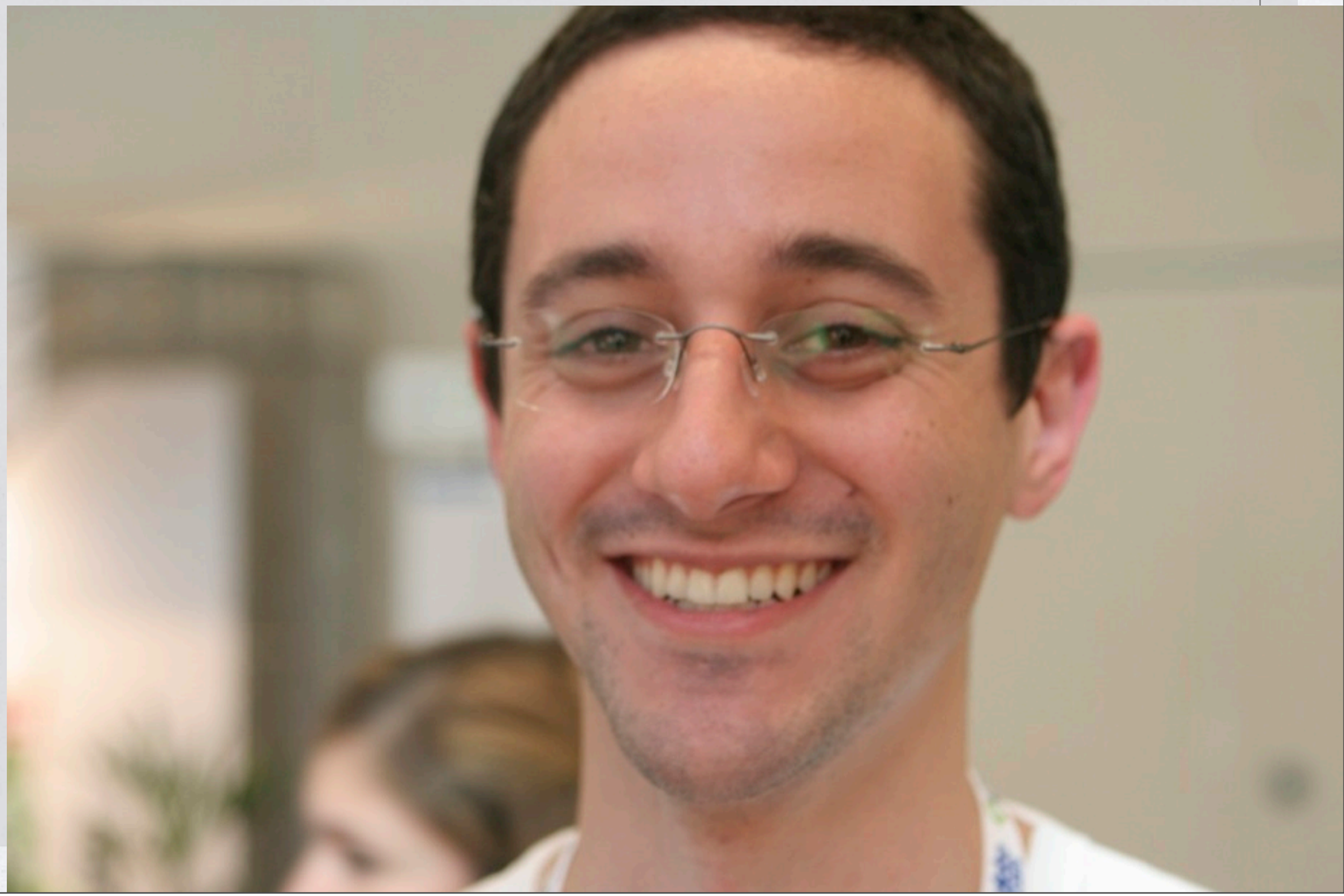
which payment or calendar?

#json, #xml,
#soap #etc?

which #json, #xml #etc?

exercise

who is that guy?

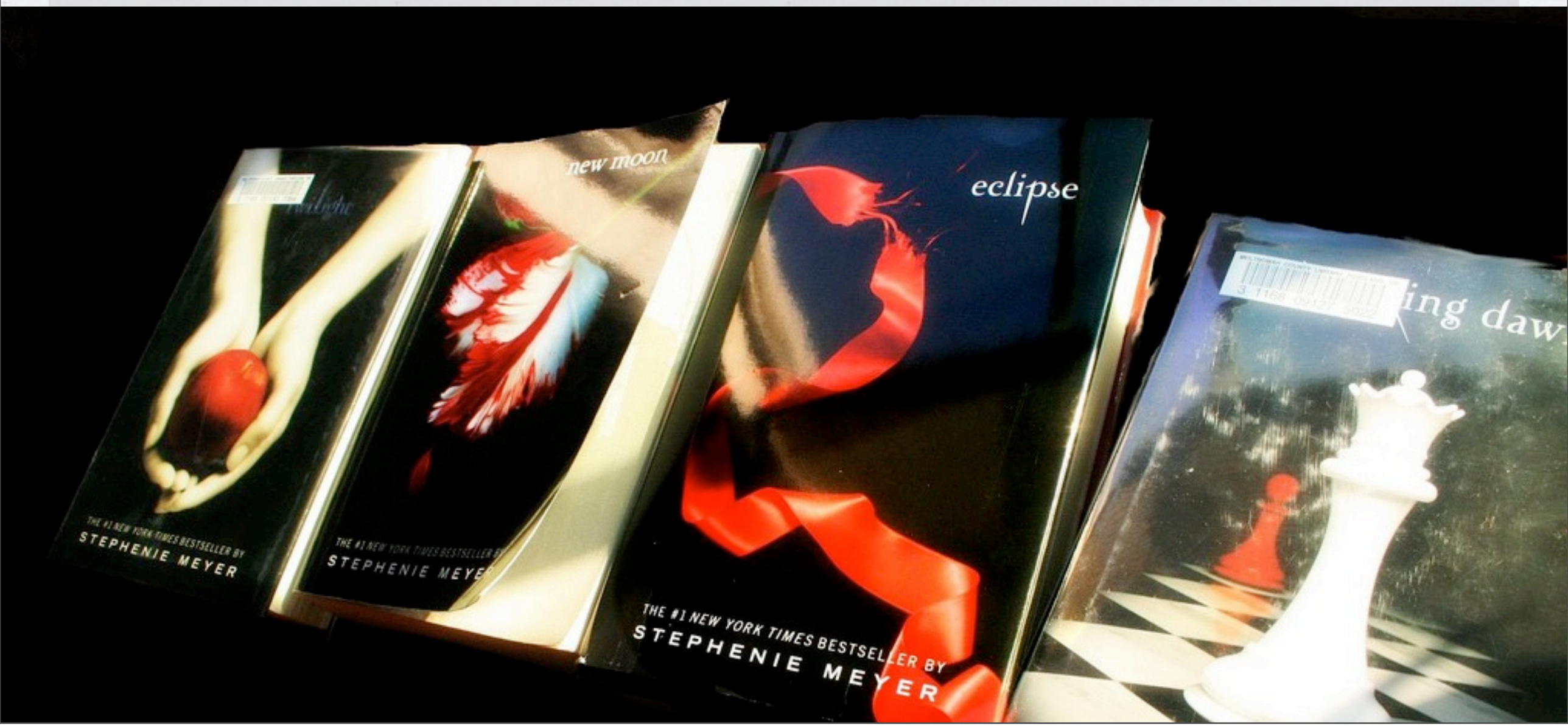


who is that girl?

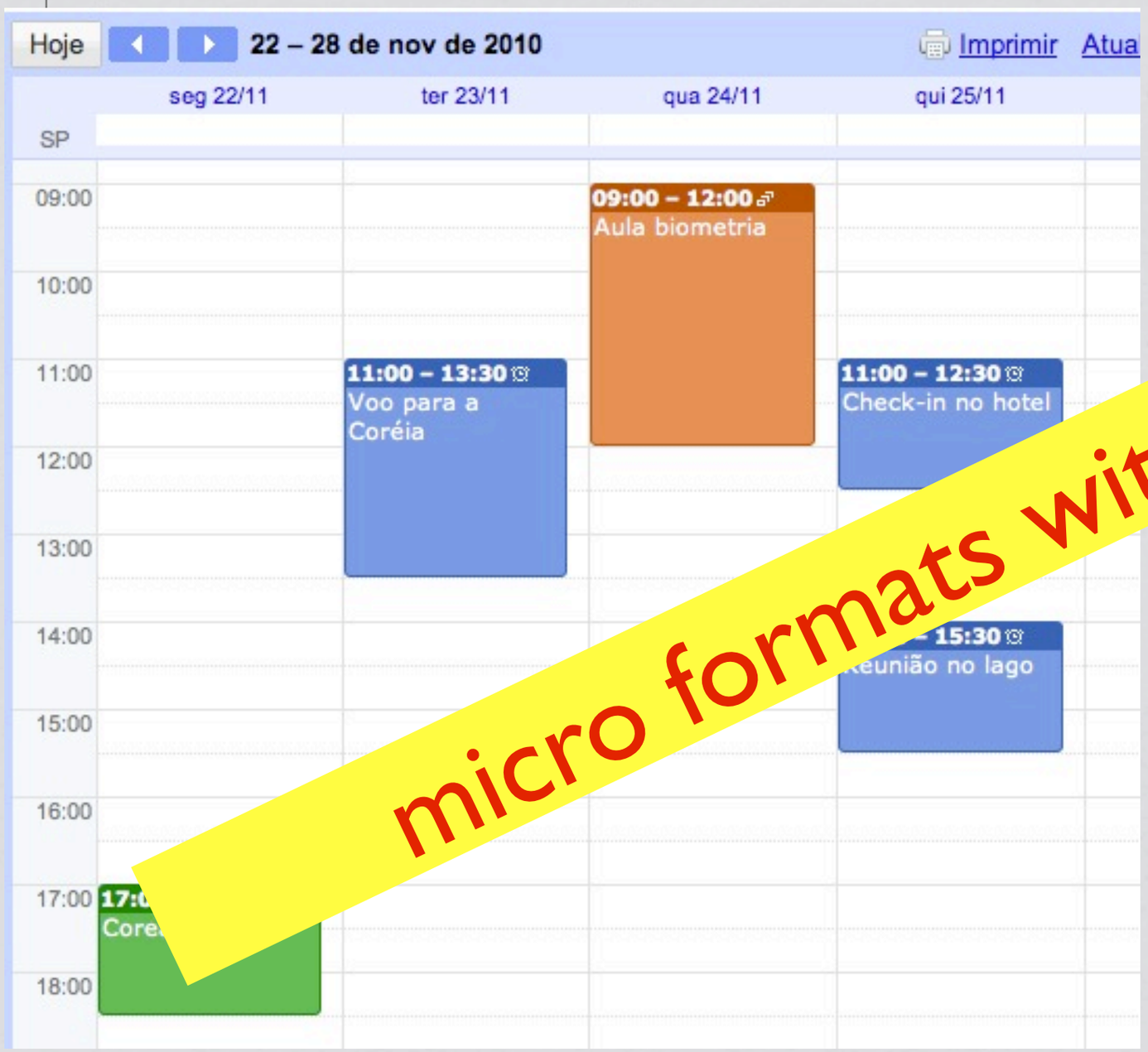
too easy, right? who is that little girl?

she is not my daughter

content without semantic has no value!



so what?



micro formats with hyperlinks!

micro formats, media types, rdf etc

integration over the web

$$\int_{2010}^{+\infty} web = semantics + rest$$

saving money

```
def flights_of(site)
  base = Restfulie.at(site).get
  flights = base.link("opensearch").get.fill("flight").with(:from =>
"GRU", :to => "JFK").get
end

voos = flights_of("kayak")
voos << flights_of("tam")
voos << flights_of("gol")
voos << flights_of("cvc")

cheapest_flight(voos).link("payment").post(card_hell)
```

bank

```
flight = cheapest_flight(flights)

bank = Restfulie.at("my_bank").auth(myself).get

auth = bank.cards["lisa"]
                .authorization(1.min, flight.price)
flight.link("payment").post(auth)
```

email

Travel Document - Paris 11/12/10 aviao | X

Orbitz to Guilherme sho

Images are not displayed.
Display images below - Always display images from travelercare@orbitz.com

Your Travel Document

Hello Guilherme,

Au

Guilherme Silveira to **trips** show details

Guilherme Silveira
Caelum | Ensino e Inovação
http://www.caelum.com.br/
- Show quoted text -

KAYAK

Devoxx Belgium 2010

Fri Nov 12 2010 to Wed Nov 24 2010

My Trips > Devoxx Belgium 2010

Friday, Nov 12 2010 – Paris, France

Add event

6:15 pm
BRST

14h 25m

São Paulo (GRU) to **Paris (ORY)** – Conf #:

Modify

Booking receipt received Thu Aug 26 2010. report inaccuracies view original email

This flight leaves on **Fri Nov 12 2010** and arrives on **Sat Nov 13 2010**.

TAP Portugal Flight 196	**Takeoff:** 6:15 pm BRST São Paulo (GRU) map Seat(s): 15G	**Landing:** 6:15 am WET Lisbon (LIS) map

Layover in Lisbon (LIS) for 1 hour 55 minutes

TAP Portugal Flight 432	**Takeoff:** 8:10 am WET Lisbon (LIS) map Seat(s): 4C	**Landing:** 11:40 am CET Paris (ORY) map

Travelers: GUILHERME SILVEIRA (Ticket#)

Vendor info: Orbitz ($1,136.19 total cost) 408-757-5160 Ref#

add notes

Sat

Devoxx Belgium 2010

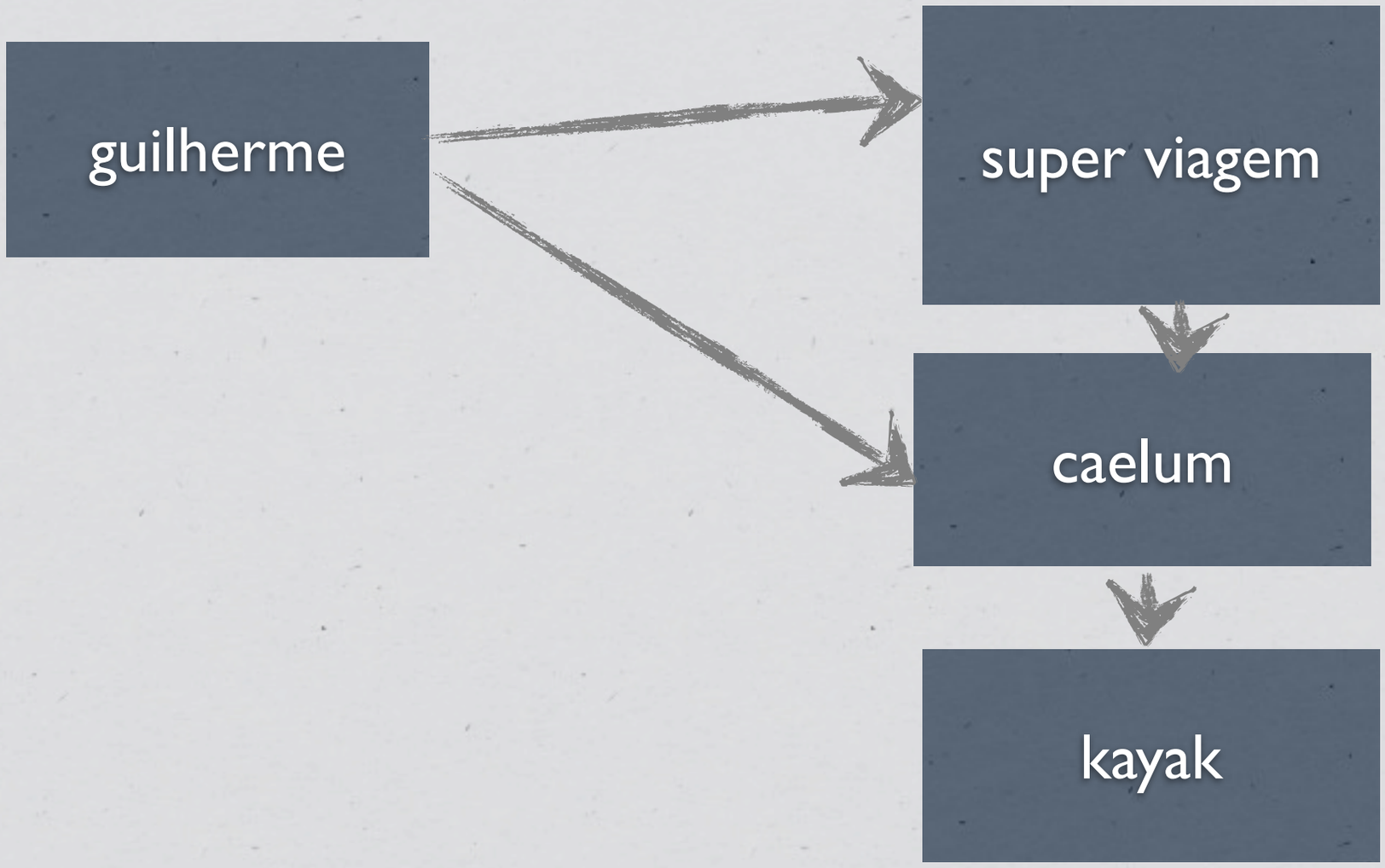
Fri, Nov 12 - Wed Nov 24 2010

TAP Portugal

Multiple

Find a car »

email



Goal me!

your process
goal: buy something

enter


amazon.com
Hello, Guilherme Silveira. We have recommendations for you. (Not Guilherme?)
Guilherme's Amazon.com
Today's Deals
Gifts & Wish Lists
Gift Cards
Shop All Departments
Search
All Departments
Books
Movies, Music & Games
Digital Downloads
Kindle
Computers & Office
Electronics
Home & Garden
Grocery, Health & Beauty
Toys, Kids & Baby
Clothing, Shoes & Jewelry
Sports & Outdoors
Tools, Auto & Industrial
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Books for Kids &
Chapter 1
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#1 Bestselling Product on Amazon
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select

Advanced Search | Browse Subjects | New Releases | Bestsellers | The New York Times® Bestsellers | Libros En Español | Bargain Books | Text

Harry Potter Paperback Box Set (Books 1-7) [Paperback]

J.K. Rowling (Author)

(520 customer reviews)

List Price: $86.93

Price: $50.85 & this item ships for **FREE with Super Saver Shipping**. Details

You Save: $36.08 (42%)

In Stock.

Ships from and sold by **Amazon.com**. Gift-wrap available.

Want it delivered Tuesday, May 25? Order it in the next 6 hours and 0 minutes, and choose **One-Day Shipping** at checkout. Details

34 new from $49.99 **15 used** from $50.84

Formats | Amazon Price | New from | Used from

Quantity: 1

Add to Cart

or

Sign in to turn on 1-Click ord

or

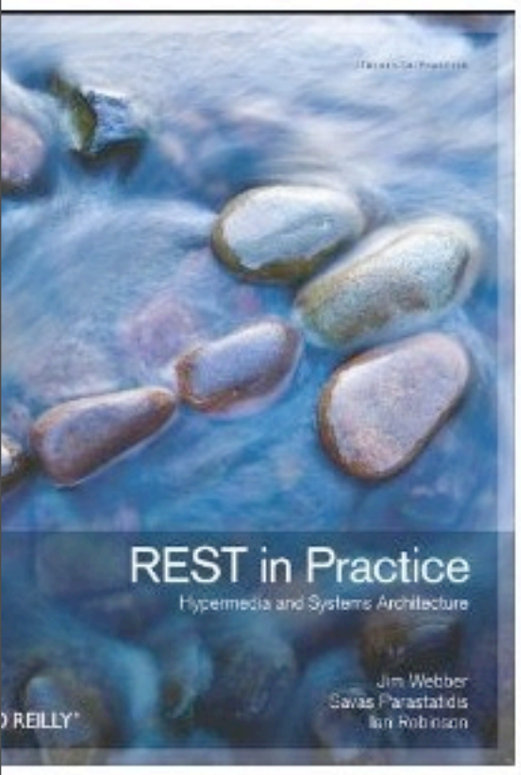
Add to Cart with FREE Two-Day Shippin

Amazon Prime Free Tri required. Sign up when y check out. Learn More

Add to Wish List

Add to Baby Registry

select another one



REST in Practice: Hypermedia and Systems Architecture
[Paperback]
Jim Webber (Author), Savas Parastatidis (Author), Ian Robinson (Author)

List Price: ~~$39.99~~
Price: $26.39 & this item ships for **FREE with Super Saver Shipping**. Details
You Save: $13.60 (34%)
Pre-order Price Guarantee. Learn more.

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or
Pre-order with FREE Two-Day Shipping
Amazon Prime Free Trial required. Sign up when yo check out. Learn More
Add to Wish List
Express Checkout with PayPh
Guilherme's Numerous Articles

buy

sequence

```
list = Restfulie.at("http://localhost:3000/items").accepts("application/xml").get

basket = {:items => [{:id => list.item[1].id}]}

basket = list.basket.post!(basket, :root => "basket")

payment = {:cardnumber => "4850000000000001", :cardholder => "guilherme silveira", :amount => basket.price}

receipt = basket.payment.post!(payment.to_xml(:root => "payment"))
```

analyze

choose

execute

what comes next?

what comes next?

do not expect!

adaptation

scenarios

```
When there is a required item
And there is a basket
But didnt create a basket
Then create the basket

When there is a required item
And there is a basket
Then add to the basket

When it is a basket
And there are still products to buy
Then start again

When there is a payment
Then pay
```

mikyung (restfulie's simple rule engine)

steps

```
When "there is a basket" do |resource|
  resource.values.first.links.basket
end
```

```
When "it is a basket" do |resource|
  resource.keys.first == "basket"
end
```

```
Then "pay" do |resource|
  payment = {:payment => {:cardnumber => "4850000000000001",
  resource.basket.links.payment.post! payment
end
```

rule engines

Sample me!

search me

describing my search

"This is how you search me"
1. fill in this form
2. send it to this uri using get
3. you will get the results in xml
4. if you want it in json, use this other uri, please
5. if you want the second page, do not forget this parameter

and my result

in your desired format

opensearch descriptor

<Url type="application/atom+xml"
template="http://localhost:3000/products?q={searchTerms}
&pw={startPage?}&format=atom" />

opensearch descriptor

<Url type="application/atom+json"
template="http://localhost:3000/products?q={searchTerms}
&pw={startPage?}&format=json" />

opensearch descriptor

```
$ curl http://localhost:3000/products/opensearch.xml

<?xml version="1.0" encoding="UTF-8"?>
    <OpenSearchDescription xmlns="http://a9.com/-/spec/
opensearch/1.1/">
      <ShortName>Restbuy</ShortName>
      <Description>Restbuy search engine.</Description>
      <Tags>restbuy</Tags>
      <Contact>admin@restbuy.com</Contact>
      <Url type="application/atom+xml"
        template="http://localhost:3000/products?q={searchTerms}
&amp;pw={startPage?}&amp;format=atom" />
</OpenSearchDescription>
```

opensearch result

curl http://localhost:3000/products?q=apple -H "Accept: application/atom+xml"

```
<feed xmlns="http://www.w3.org/2005/Atom">
  <entry>
    <link href="http://localhost:3000/products/1" rel="self" type="application/atom+xml"/>
    <id>1</id>
    <name>Apple macbook pro</name>
    <price>1000.0</price>
  </entry>
  <link href="http://localhost:3000/orders" rel="order" type="application/xml"/>
</feed>
```

consuming opensearch

```
uri = "http://localhost:3000/products/opensearch.xml"
type = 'application/opensearchdescription+xml'
description = Restfulie.at(uri).accepts(type).get.resource
```

```
items = description.use("application/atom+xml").
          search(:searchTerms => what, :startPage => 1)

items.resource.entries.size
```

consuming another system

```
uri = "http://localhost:3000/products/opensearch.xml"
type = 'application/opensearchdescription+xml'
description = Restfulie.at(uri).accepts(type).get.resource
```

```
items = description.use("application/atom+xml").
          search(:searchTerms => what, :startPage => 1)

items.resource.entries.size
```

consuming another system

```
uri = "http://localhost:3000/products/opensearch.xml"
type = 'application/opensearchdescription+xml'
description = Restfulie.at(uri).accepts(type).get.resource
```

```
items = description.use("application/atom+xml").
          search(:searchTerms => what, :startPage => 1)

items.resource.entries.size
```

consume multiple searches

costs?

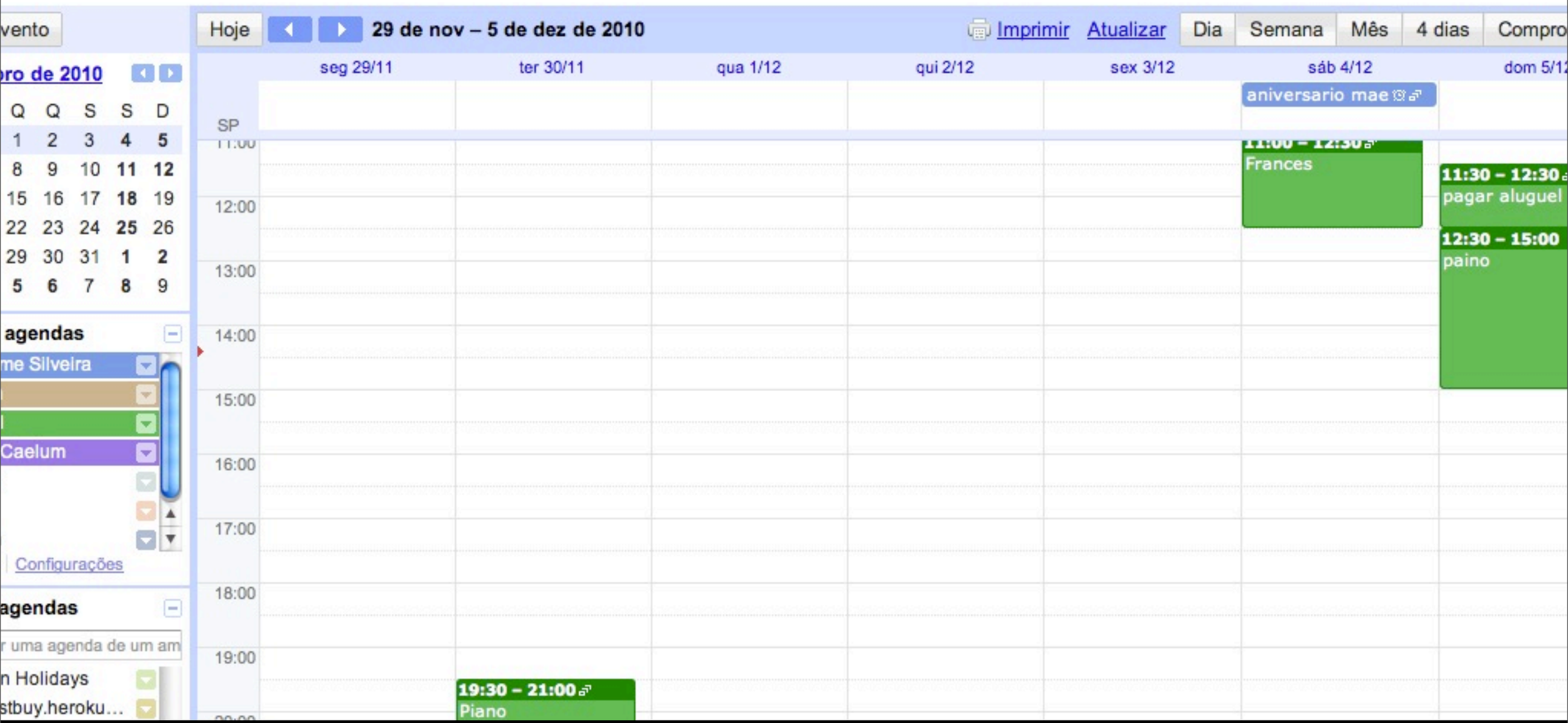
201 search variation

Sample me!

calendar server example

```
    content = "BEGIN:VCALENDAR
CALSCALE:GREGORIAN
PRODID:iCalendar-Master
VERSION:2.0
BEGIN:VEVENT
DTSTART;VALUE=DATE:#{time_format(@order.expected_delivery)}
DTEND;VALUE=DATE:#{time_format(@order.expected_delivery)}
SUMMARY:Delivering order #{@order.id}
```

calendar client example



rest helps products for humans too

evolve your calendar into gmail

server code

```
X-GOOGLE-CALENDAR-CONTENT-TITLE:Buying order #{@order.id}
X-GOOGLE-CALENDAR-CONTENT-ICON:http://www.google.com/calendar/
X-GOOGLE-CALENDAR-CONTENT-URL:#{order_url(@order)}
X-GOOGLE-CALENDAR-CONTENT-TYPE:text/html
X-GOOGLE-CALENDAR-CONTENT-WIDTH:640
X-GOOGLE-CALENDAR-CONTENT-HEIGHT:480
```

client view

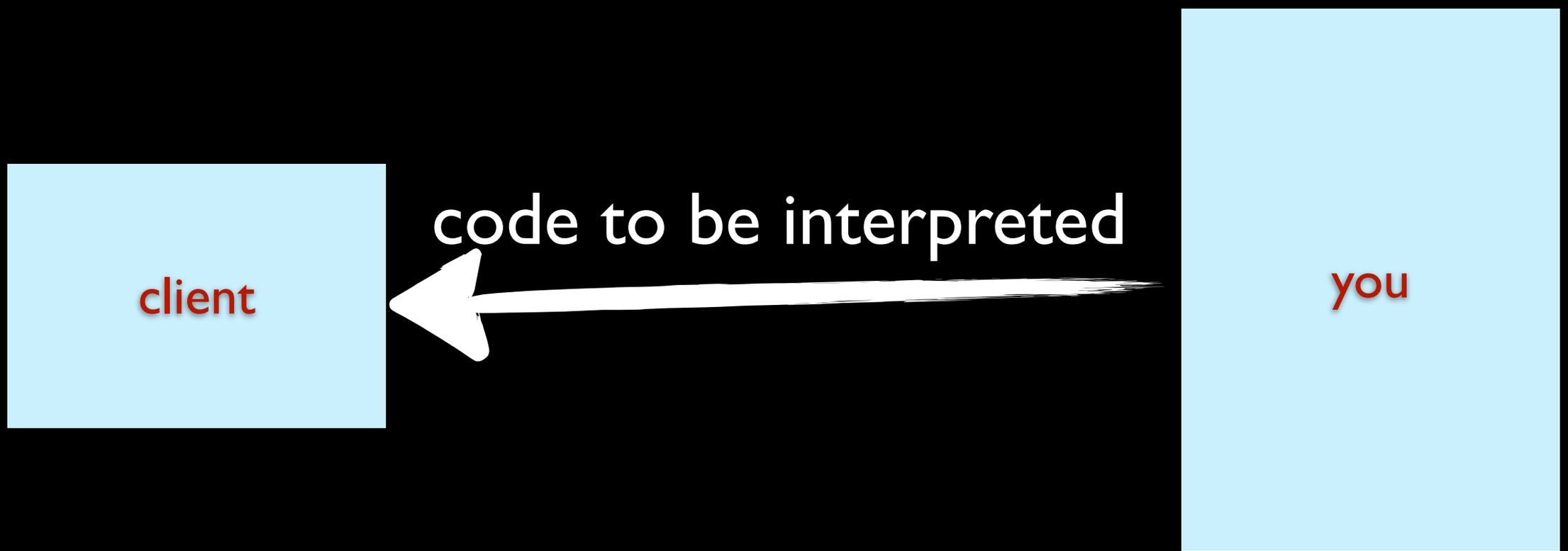
client view++

your process

your flow

a domain application process

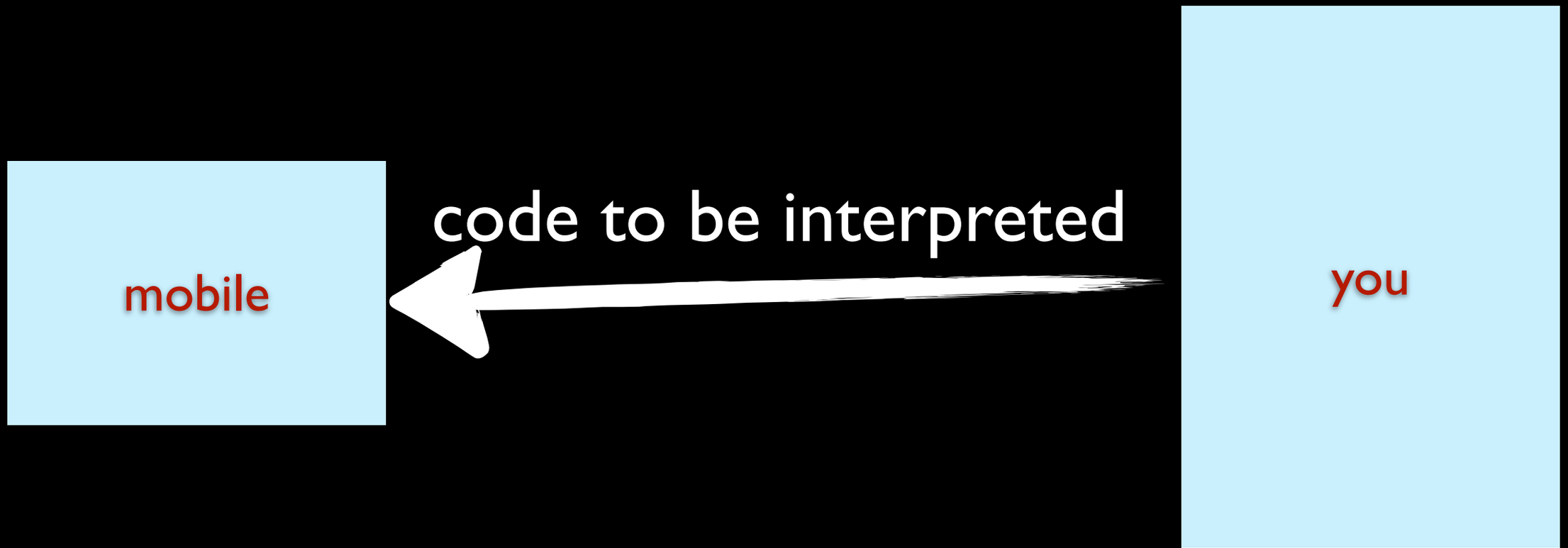
teach your client



one existing example?

custom mobile applications

teach your mobile client



learn

hundreds of existing examples?

human web+-

JSONP

code on demand

same security issues

machine web

javascript

lisp

suggested by Pedro Teixeira

but my client

my client is not clever

my client is a browser

we are talking about js

but my client

my client is not clever

client runs somewhere

pay attention

www2010

http://iansrobinson.com/

http://www.amundsen.com/blog/

javascript is everywhere

subbu's blog

subbu.org

composite media types

atom

xhtml

websockets

events

negative

positive

must ignore

Thoughtworks anthology book

bottom up

design by committe

mime type?

microformat

controlled vocabulary

hypermedia

integration over the web

code on demand

extend on demand

guilherme.silveira@caelum.com.br http://www.caelumobjects.com

thank you

Put your server to REST

leonard richardsons model

Server Maturity

1 uri, 1 http verb

```
/services.do?action=install&...
```

```
@Path("/services")
public class Services {

   @GET
   public Response services(
      @QueryParam("action") String action) {

      ServiceFactory factory = new ServiceFactory();
      Service service = factory.getServiceFor(action);
      return service.execute();
   }

}
```

Server Maturity

1 uri, 1 http verb

```
public class InstallService {

   public Response execute() {
      return Response.ok()
                     .type("application/xml")
                     .entity("<service>...</service>")
                     .build();
   }

}
```

But?

1 uri, 1 http verb

/services.do?action=install&...

I know them all beforehand.

1 uri, 1 http verb

/services.do?action=install&...

Any change will break all our clients!

a priori knowledge

=

coupling++

Server Maturity

Multiple uris, 1 http verb

/install?...

```
@Path("/services")
public class Services {

  @GET @Path("install")
  public Response install() {
    return new InstallService().execute();
  }

  @GET @Path("uninstall")
  public Response uninstall() {
    return new UninstallService().execute();
  }
```

but...

GET hell

GET should not imply in undesireable effects

POST hell

GET could help us with cache!

Server Maturity

Multiple uris, multiple verbs

```
POST /cloud
GET /cloud/1547437/software
POST /cloud/1547437/software
```

rails + restfulie

rubyonrails.org

```
class SoftwaresController < ApplicationController

  acts_as_restfulie
  respond_to :xml, :json

  def create
    @item = Item.create(params[:item])
    respond_with @item, :status => :created
  end

  def show
    @item = Item.find(params[:id])
    respond_with @item
  end
end
```

Vraptor

vraptor.org/en

```
@Resource
public class SoftwareResource {

  public void install() {
    Software software = SoftwareRepository.register
                                          (software);
    response.created(software);
  }

  public void uninstall() {
    response.deleted(software);
  }

}
```

JAX-RS

```
@Path("/softwares")
public class SoftwareResource {

   @POST @Consumes("application/xml")
   public Response install(Software software) {
      software = SoftwareRepository.register(software);
      long id = software.getId();
      URI uri = UriBuilder.fromPath("/softwares/" + id)
                                          .build();
      software.install();
      return Response.created(uri).build();
   }
```

JAX-RS

```
@DELETE @Path("{id}")
public Response uninstall(@PathParam("id") Long id) {
   Software software = SoftwareRepository.retrieve(id);
   software.uninstall();
   return Response.ok().build();
}
```

Uniform Interface++

Resources++

Http verbs example

- POST creates
- PUT replaces
- PATCH updates
- DELETE removes
- GET retrieves
- OPTIONS tells me what i can do
- ...

Is a Restful service

a cute CRUD?


yes

but there is more!

hypermedia

enter amazon.com

search (GET)

follow links

search (GET)

create a basket (POST)

create a payment (POST)

fill forms

Cloud API

GET /user/15	retrieves an user
follow GET	accesses its machines
follow POST self	installs a new machine
follow POST	pay for it

retrieves an user


```
$ curl http://localhost:9998/user/574 -i
HTTP/1.1 200 OK
...
```

user

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<user>
    <link rel="machines" href="/user/574/machines"/>
    <name>guilherme silveira</name>
    <website>www.caelum.com.br</site>
    <link rel="payment" href="/payment/custom"/>
    ...
</user>
```

maschine maschine maschine


```
$ curl http://localhost:9998/user/574/machines -i
HTTP/1.1 200 OK
Content-Type: application/xml
```

maschine

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<machines xmlns:ns2="http://www.w3.org/2005/Atom">
  <machine>
    <ns2:link rel="self" href="/user/574/machines/1"/>
    <ns2:link rel="software" href="/machines1/softwares"/>
    <id>1</id>
    <host>www.caelum.com.br</host>
    <softwares>
      <software>
        <id>1234</id>
        <ns2:link rel="self" href="/softwares/1234"/>
      </software>
    </softwares>
  </machine>
</machines>
```

payment

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<user>
    <link rel="machines" href="/user/574/machines"/>
    <name>guilherme silveira</name>
    <website>www.caelum.com.br</site>
    <link rel="payment" href="/payment/custom"/>
    ...
</user>
```

#buthow?

```java
@XmlRootElement
@XmlType(propOrder= {"id", "host", "softwares", "links"})
public class Machine {
  private final all variables here;

  @XmlElement(name="link", namespace="http://www.w3.org/2005/Atom")
  public List<Link> getLinks() {
    return Arrays.asList(
      Link.to("/machines/" + getId(), "self"),
      Link.to("/machines/" + getId() + "/softwares", "softwares")
    );
  }

  @XmlElementWrapper(name="softwares")
  @XmlElement(name="software")
  public List<Software> getSoftwares() {
    return softwares;
  }

  public void install(Software software) {
    getSoftwares().add(software);
  }

  public void uninstall(Software software) {
    getSoftwares().remove(software);
  }

}
```

Machine.java

MachineResource

```
@Path("/machines")
public class MachineResource {

  @Path("{id}/softwares")
  public SoftwareResource softwares(@PathParam("id") Long id) {
    Machine machine = new MachineRepository().retrieve(id);
    if (machine != null) {
      SoftwareResource softwareResource = new SoftwareResource();
      softwareResource.setMachine(machine);
      return softwareResource;
    }
    throw new WebApplicationException(404);
  }

  @POST @Consumes("application/xml")
  public Response create(Machine machine) {
    Long id = new MachineRepository().save(machine);
    return Response.created(UriBuilder.fromPath("/" + id).build()).build();
  }

  @GET @Path("{id}")
  @Produces("application/xml")
  public Machine show(@PathParam("id") Long id) {
    return new MachineRepository().retrieve(id);
  }

  @GET
  @Produces("application/xml")
  public Machines list() {
    Machines machines = new Machines();
    machines.setMachine(new MachineRepository().list());
    return machines;
```

Server Model

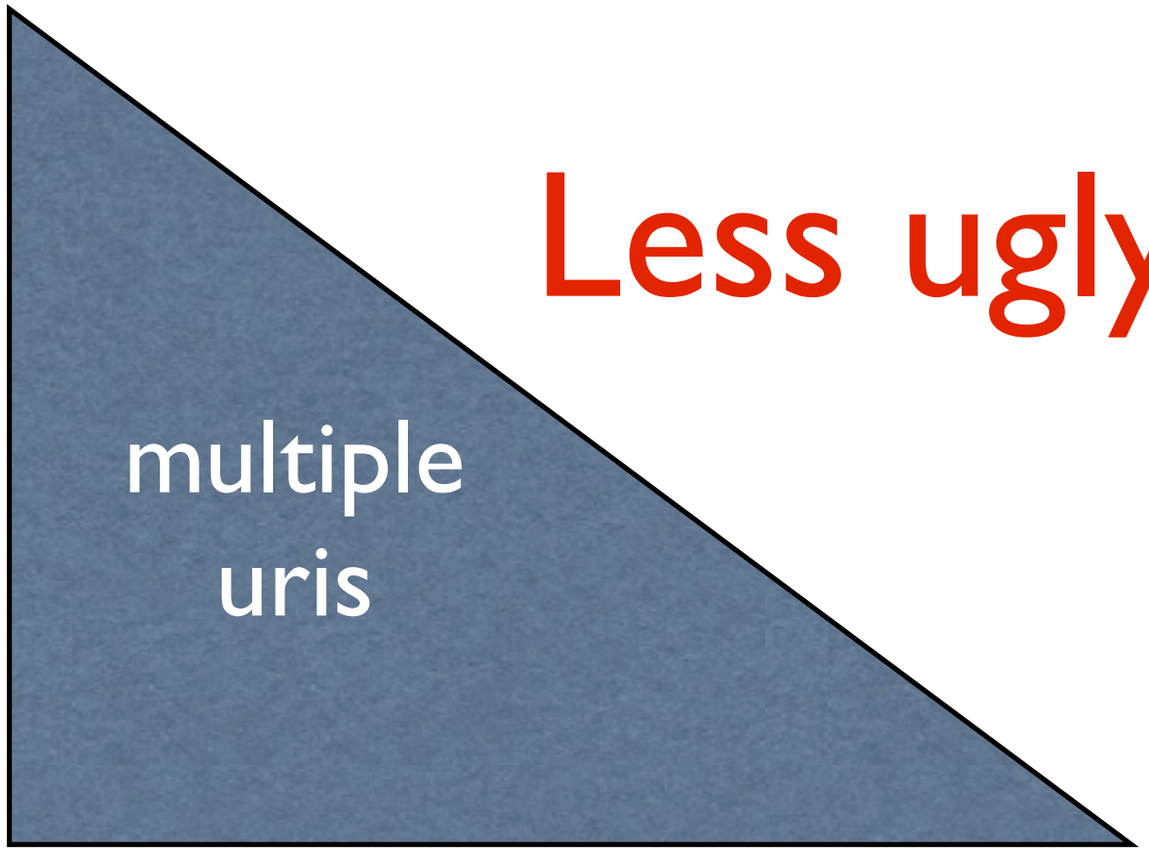
according to
Leonard Richardson, 2008

Ugly

one uri + one verb

Server Model

according to
Leonard Richardson, 2008



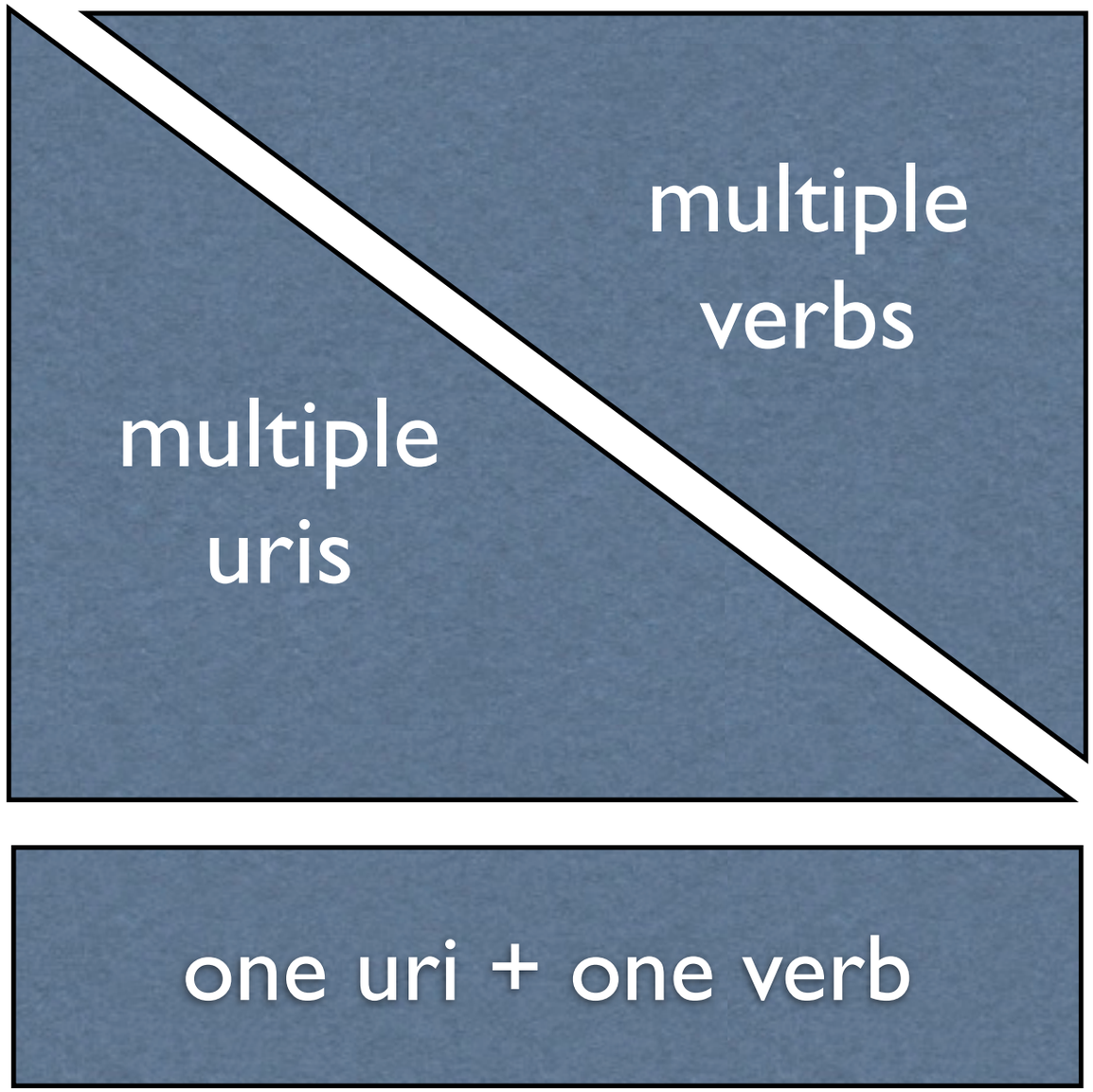
Less ugly

one uri + one verb

Server Model

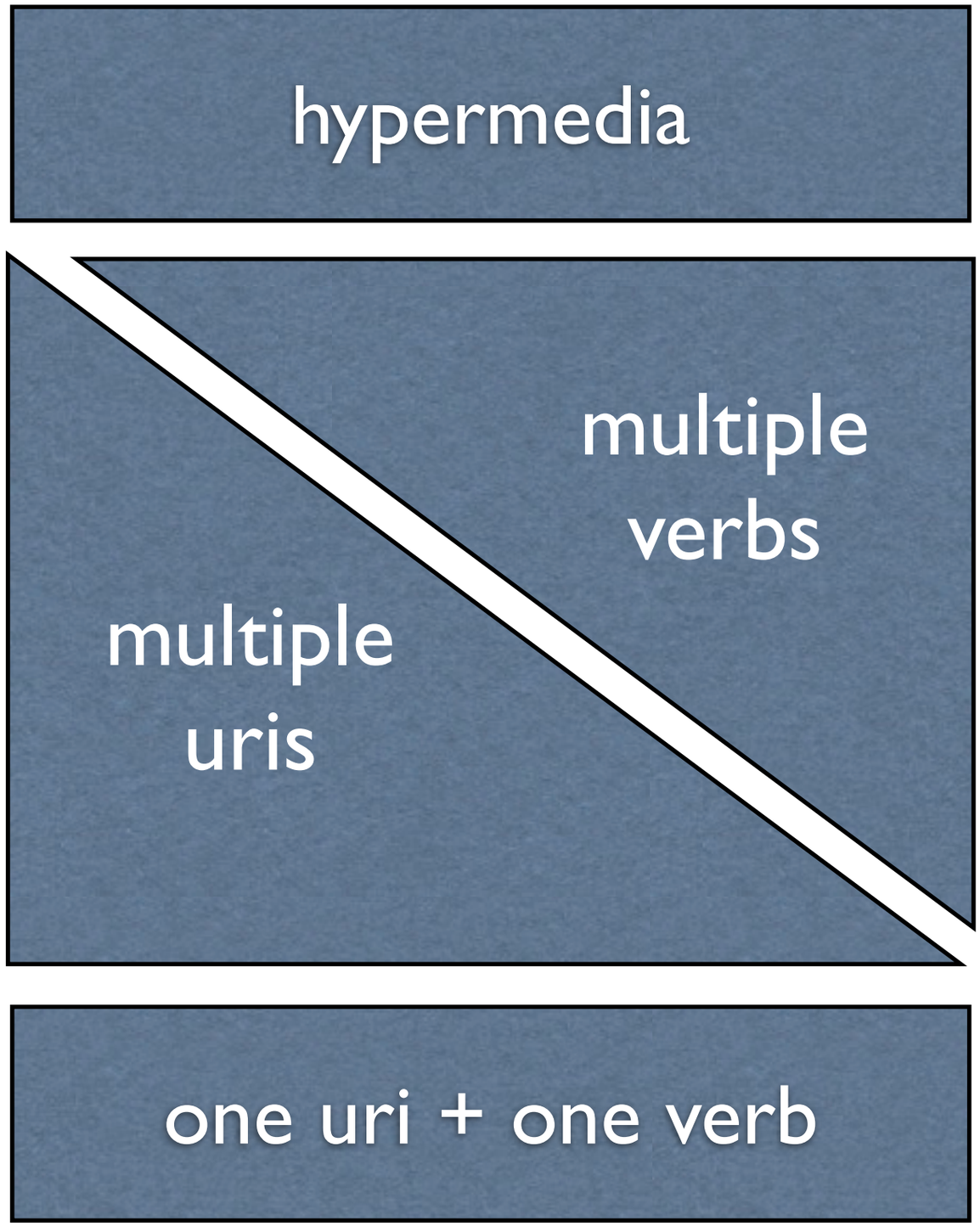
according to
Leonard Richardson, 2008

cute CRUD



Server Model

according to
Leonard Richardson, 2008



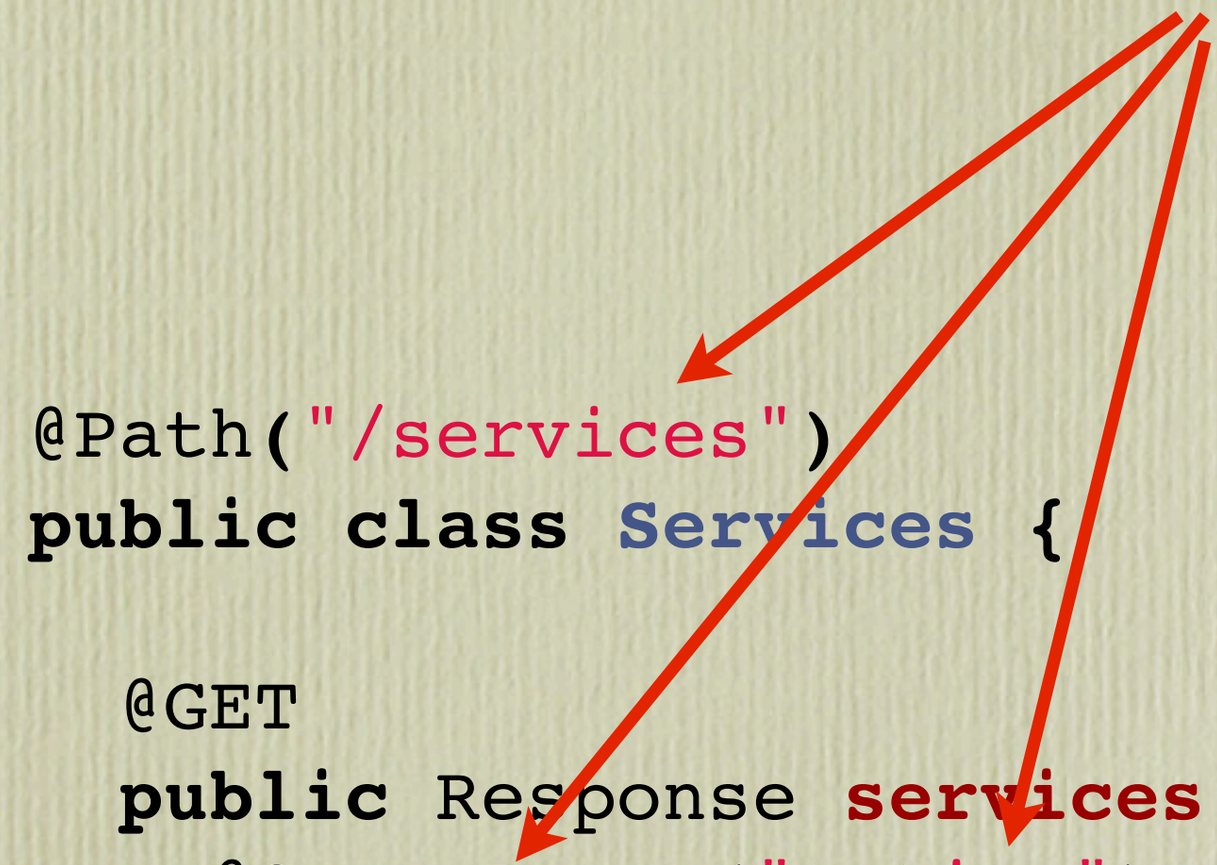
JAX-RS wishlist

VRaptor and Restfulie

examples in java

vraptor.org/en

1. conventions?



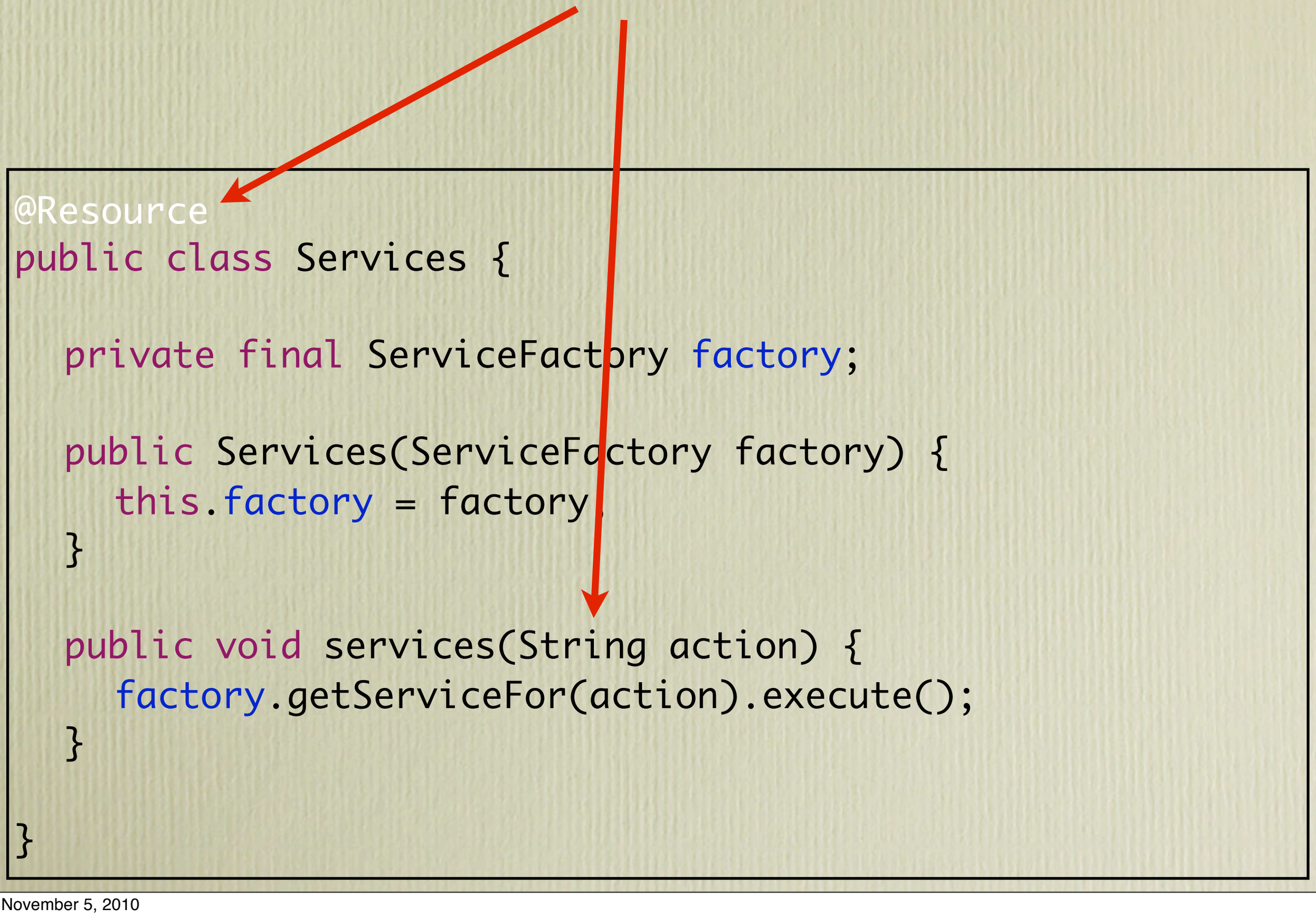
```
@Path("/services")
public class Services {

   @GET
   public Response services(
      @QueryParam("action") String action) {

      ServiceFactory factory = new ServiceFactory();
      Service service = factory.getServiceFor(action);
      return service.execute();
   }

}
```

Convention over Configuration



```
@Resource
public class Services {

   private final ServiceFactory factory;

   public Services(ServiceFactory factory) {
      this.factory = factory;
   }

   public void services(String action) {
      factory.getServiceFor(action).execute();
   }

}
```

do you want to avoid copy+paste?

yes!

2. TDD: hard to test

```
@Path("/products")
public class Products {

   @GET
   public Response create(
      @QueryParam("what") String what) {

      // persists
      return Response.ok()
                .type("application/xml")
                .entity("<product>...</product>")
                .build();
   }

}
```

coupled to the implementation

TDD: mock it

coupled to the interface

couple--

```
@Resource
public class Services {

   private final Response response;

   public Services(Response response) {
      this.response = response;
   }

   public void services(String action) {
      response.getServiceFor(action).execute();
   }

}
```

3. Content negotiation by hand

```
@Path("/softwares")
public class SoftwareResource {

   @POST @Consumes("application/xml")
   public Response install(Software software) {
      software = SoftwareRepository.register(software);
      long id = software.getId();
      URI uri = UriBuilder.fromPath("/softwares/" + id)
                                          .build();
      software.install();
      return Response.created(uri).build();
   }
```

Let us do it for you.

```
@Resource
public class SoftwareResource {

   @Post @Consumes
   public void install(Software software) {
      software = SoftwareRepository.register(software);
      response.created(software);
   }
```

4. URI coupling

writing the URI once

```
...

  @GET @Path("/softwares/{id}")
  public Response install(@QueryParam("id") Software
software) {
    // ...
  }
```

4. URI coupling

writing the URI again several times

```
@Path("/softwares")
public class SoftwareResource {

   @POST @Consumes("application/xml")
   public Response install(Software software) {
      software = SoftwareRepository.register(software);
      long id = software.getId();
      URI uri = UriBuilder.fromPath("/softwares/" + id)
                                          .build();
      software.install();
      return Response.created(uri).build();
   }
```

4. URI coupling

code

```
@Path("/softwares")
public class SoftwareResource {

   @POST @Consumes("application/xml")
   public Response install(Software software) {
      software = SoftwareRepository.register(software);
      long id = software.getId();
      URI uri = UriBuilder.fromPath("/softwares/" + id)
                          .build();
      software.install();
      return Response.created(uri).build();
   }
```

ZERO uri replication

```
@Resource
public class SoftwareResource {

   @Post @Consumes
   public void install(Software software) {
      // ...
      response.use(SoftwareResource.class).show(software);
   }

}
```

5. Parameter list

```
@Path("/machines")
public class MachineResource {

  @Path("{id}/softwares")
  public SoftwareResource softwares(@PathParam("id") Long id) {
    Machine machine = new MachineRepository().retrieve(id);
    if (machine == null) {
      throw new WebApplicationException(404);
    }
    // ...
  }


}
```

Yes, we can do it.

```
@Resource
public class MachineResource {

   @Post ("{m.id}/softwares")
   public SoftwareResource softwares(Machine m) {
      Machine machine = new MachineRepository().retrieve(m
      // ...
   }
```

parameter converter chain of responsability

example

restfulie.caelumobjects.com

```
Response response = client.at
    ("http://localhost:9998/user/574").get();

User user = response.getResource();
System.out.println("user: " + user.getName());
```

6. Client internal DSLs

```
User user = response.getResource();
System.out.println("user: " + user.getName());

Link link = resource(user).getLink("machine");
response = link.follow().post(new Machine());
```

```
Link link = resource(user).getLink("machine");
response = link.follow().post(new Machine());


double amount = resource(user).refresh().
                                    getAmountDue();
```

```
double amount = resource(user).refresh().
                                    getAmountDue();

link = resource(user).getLink("payment");
Payment payment = new Payment(amount);
response = link.follow().post(payment);
```

```
link = resource(user).getLink("payment");
Payment payment = new Payment(amount);
response = link.follow().post(payment);

System.out.println("payment completed");
```

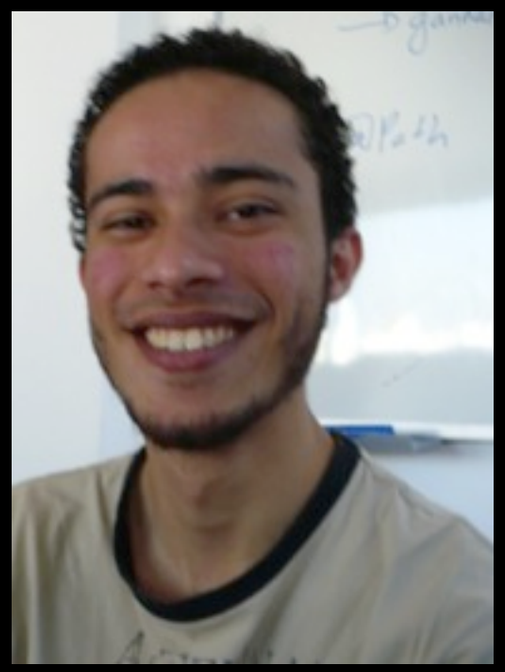
```
link = resource(user).getLink("payment");
Payment payment = new Payment(amount);
response = link.follow().post(payment);

System.out.println("payment completed");
```

i was looking for a DSL and i did not know it!

now show me the ruby code!

code samples



Lucas Cavalcanti
(java server)
@lucascs

Anderson Leite (ruby)
@anderson_leite

Further reading

- Roy Fielding dissertation
- Rest in Practice, Jim Webber and others
- Restful Webservices Cookbook, Subbu Allamaraju
- Restful Web Services, Richardson and Ruby
- JAX-RS specification
- Infoq articles on REST
- Restfulie guide

Interviews and Presentations

- Stefan Tilkov interview on InfoQ
  - http://bit.ly/9RUXKL
- Leonard Richardson's presentation at QCon
  - http://bit.ly/dj2W66
- Martin Fowler on REST
  - http://bit.ly/bx61ci

Interviews and Presentations

- Ian Robinson and Jim Webber interview
  - http://bit.ly/aEuzj3
- Jan Algermissen classification
  - http://bit.ly/cycFBF
- Guilherme Silveira on REST clients
  - http://bit.ly/aHCglv

code samples

- JAX-RS
  - http://jcp.org/en/jsr/detail?id=311
- Rails
  - http://rubyonrails.org
- Restfulie
  - http://restfulie.caelumobjects.com
- VRaptor
  - http://vraptor.org/en