



LUNATECH

Play framework 2.0

@PeterHilton at #GOTOams on 24 May 2012

- (sorry, I am not Guillaume Bort)
- **Web developer** and Operations Director at Lunatech Research in Rotterdam
 - Web application architecture, design and construction
 - Technical project management and functional design
- Play framework committer since 2010
- Co-author of the book *Play for Scala* (Manning)

About Lunatech

- Founded in **Rotterdam** in 1993 as an IT consulting, product research and **development team**
- We build **web applications**, web services, large-scale document-processing and message-processing applications, online products
- Leverage cutting-edge **open-source** software platforms
- Invest in **product research** and development
- Play framework; Java EE - JBoss AS, Seam, JPA, jBPM, Drools; back-end - PostgreSQL, Linux; front-end - jQuery, Backbone, `_.js`
- Agile software development - self-managing technical teams



“ Play introduces high-productivity
type safe web development

Presentation goal: show you how cool Play is

Outline

- What Play is and why it matters (web architecture)
- High-productivity web development (but for Java and Scala developers)
- Developer Experience (DX) that doesn't suck
- What's new in Play 2.0
- Type safe compile-time checked web development
- HTML5 web development



What Play is

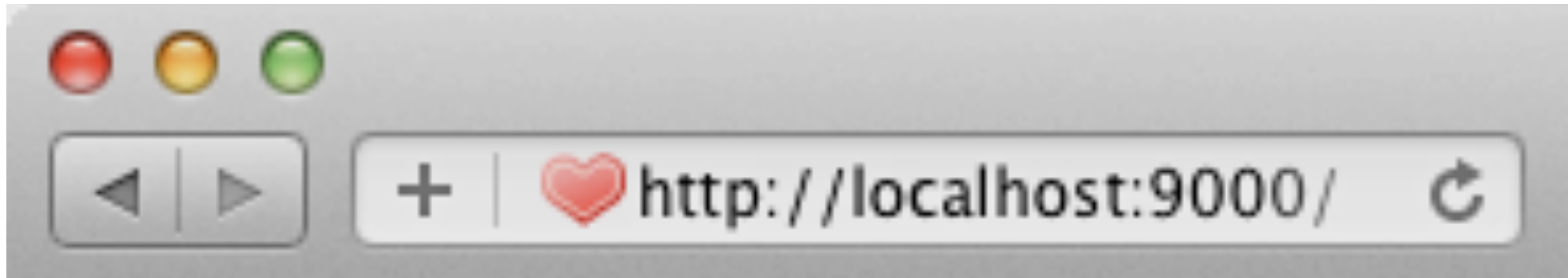
- Full-stack web framework (what you need to build an app)
- Simple, flexible and powerful HTTP interface
- High-productivity web development
- High-performance scalable architecture
- Designed *by* web developers *for* web developers
- Play is fun



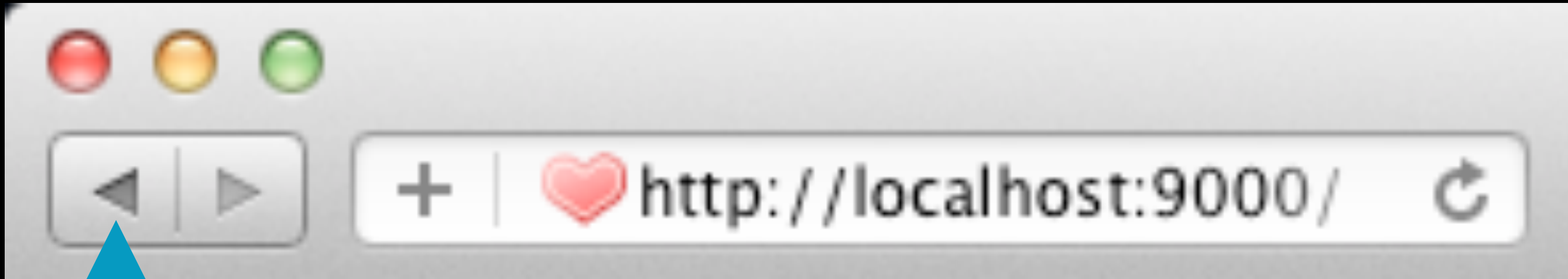


**I CAN HAS
PLAY TIME
NAO?!**

“ What is the focal-point of web application architecture?



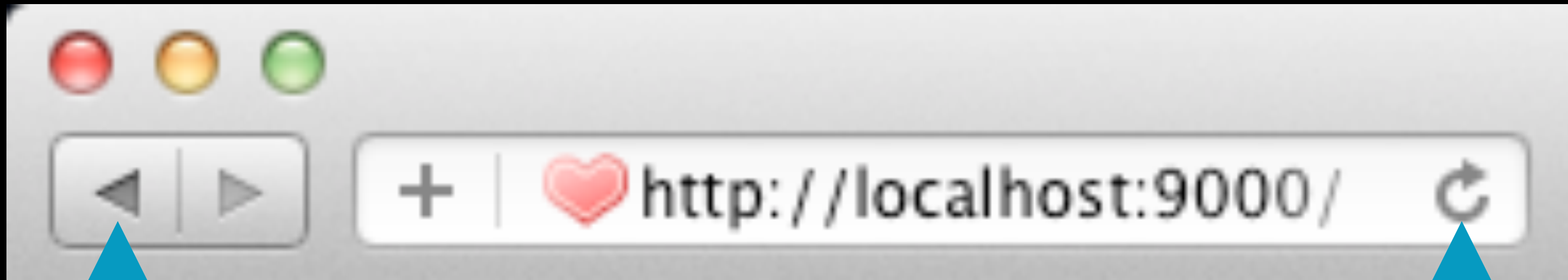
“ It’s the web browser, stupid



The **Back** button works

Play's stateless architecture is based on HTTP.

When a web framework starts an architecture fight with the web, the framework loses.

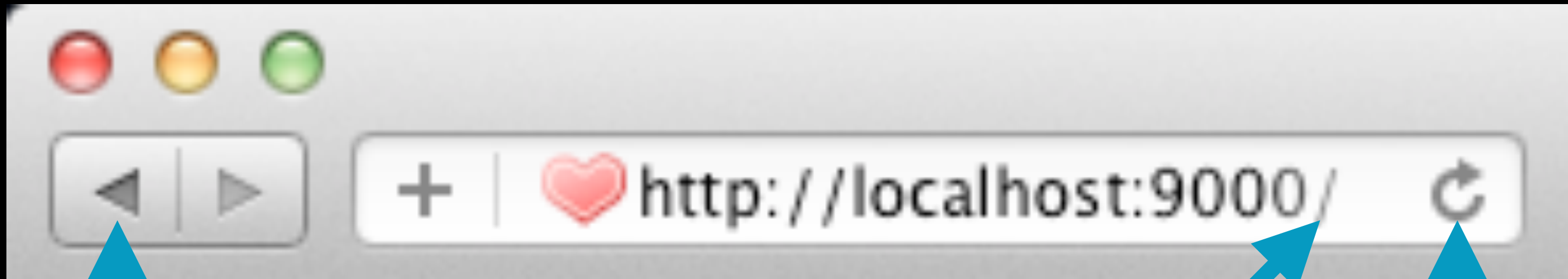


Back
button

The **Reload** button works

During development, just reload the page to see changes in your Java (or Scala) code.

That's high-productivity web development.



Back
button

You design the URL

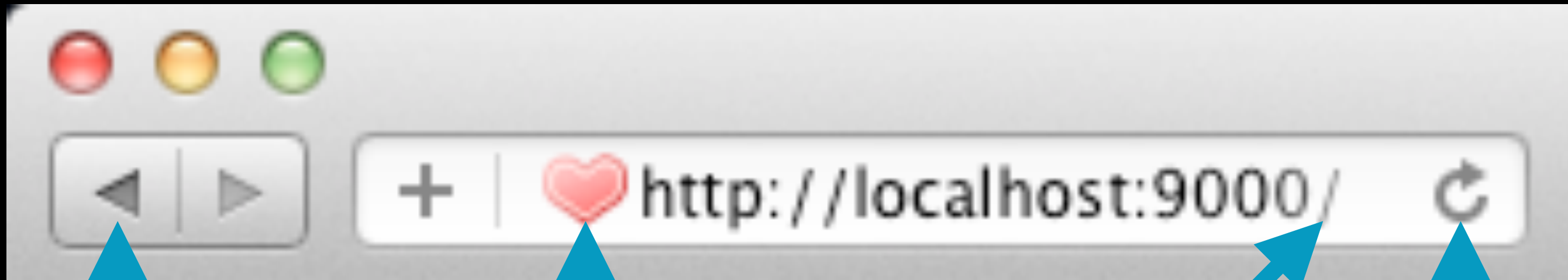
You can use 'clean' URLs:

/products

/product/42

/product/42/comments

Reload
button



Back
button

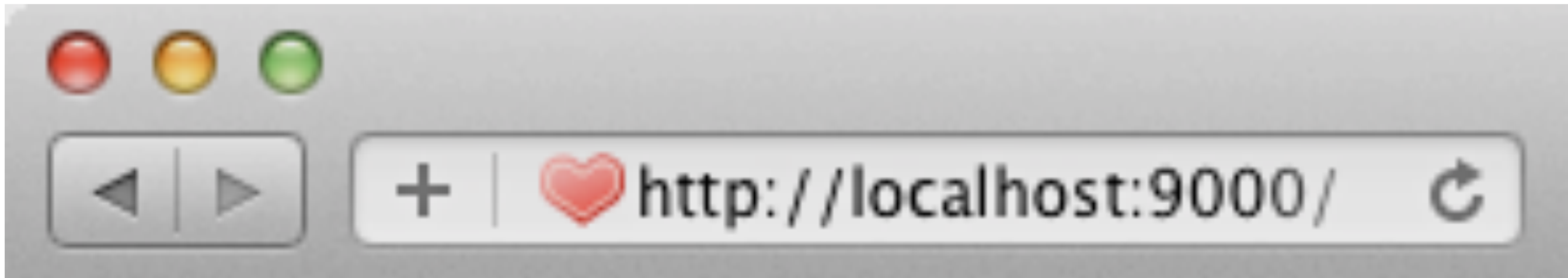
Usability (DX)

Convenient HTTP API
and template syntax

Clear error messages
and short stack traces

URL

Reload
button



“ What’s the story behind the heart icon?

“ There isn’t one.

Feel free to make one up :)

Guillaume Bort

“ Play doesn't fight HTTP or the browser

Stateless, HTTP-centric architecture...



Architecture of the World Wide Web, Volume One

W3C Recommendation 15 December 2004

This version:

<http://www.w3.org/TR/2004/REC-webarch-20041215/>

Latest version:

<http://www.w3.org/TR/webarch/>

Previous version:

<http://www.w3.org/TR/2004/PR-webarch-20041105/>

Editors:

[Ian Jacobs](#), W3C

Norman Walsh, Sun Microsystems, Inc.

Authors:

See [acknowledgments \(§8\)](#).

Please refer to the [errata](#) for this document, which may include some normative corrections.

See also [translations](#).

Stateless architecture

- No state in the application's web tier
 - e.g. Java Servlet API's HTTP session (which isn't actually part of HTTP)
- State belongs in other tiers
 - HTTP client, server cache or database
- Web application behaviour defined by URLs (requests)
- Exception for identifying authenticated user by cookie



Stateless architecture - why

- Simplifies application development and testing
 - (a URL is all you need for reproducability)
- Matches the web's stateless HTTP architecture
- Avoids synchronising state between additional layers
 - ('synchronisation' should ring tech design alarm bells)
- Enables cloud deployment and horizontal scalability
 - (search the web for "Play framework Heroku")





THE TWELVE-FACTOR APP

www.12factor.net

“ Dear Java devs, PHP and Rails devs
have been laughing at you for years
... every time they reload a page's code changes

Code reloading

- During development, reload the page to see changes in:
 - Java and Scala classes
 - configuration files
 - templates.
- Play pre-compiles classes and templates for better performance in production mode
- This just works out-of-the-box



“URLs want to be loved too

REST architecture isn't just for web service APIs

`http://app.example.com/WarRootDirectory1/ServletsOnAPlane?sessionId=x81nj38avngjLOLdxpanewq&action=NextPage&HoneyBadgerCares=false&entityId=129912743&processName=UnladenSwallowComputation&role=peon&date=14%2F02%2F2012&flagSettings=0101011&return=%2Fvideos%2Frickroll.avi`

SHYROII



URL design (HTTP routing)

- Clean URLs are stable URLs:
 - <http://example.com/products>
 - <http://example.com/product/42>
- Read it, bookmark it, mail it, tweet it
- URL-centric design:
 - Design the URL scheme before you start coding
 - Configure your application's URLs in one file



URL design (HTTP routing)

- Designed URLs are clean URLs:
 - `http://example.com/products`
 - `http://example.com/product/42`
- Corresponding Play routing configuration:

```
# HTTP routes configuration file

# method, URL path, controller action method (and params)

GET    /products          controllers.Products.list()

GET    /product/:id       controllers.Products.details(id:Long)
```

HTTP routes configuration file

27

GET / controllers.Application.index()

GET /products controllers.Products.list()

POST /products controllers.Products.add(p: Product)

GET /product/:id controllers.Products.details(id: Long)

DELETE /product/:id controllers.Products.delete(id: Long)

GET /products.json controllers.Products.listJSON()

GET /product/:id.json controllers.Products.detailsJSON(id: Long)

“ You have to be a genius to successfully use some web frameworks

For the rest of us, there are good error messages



+ |  http://localhost:8080/



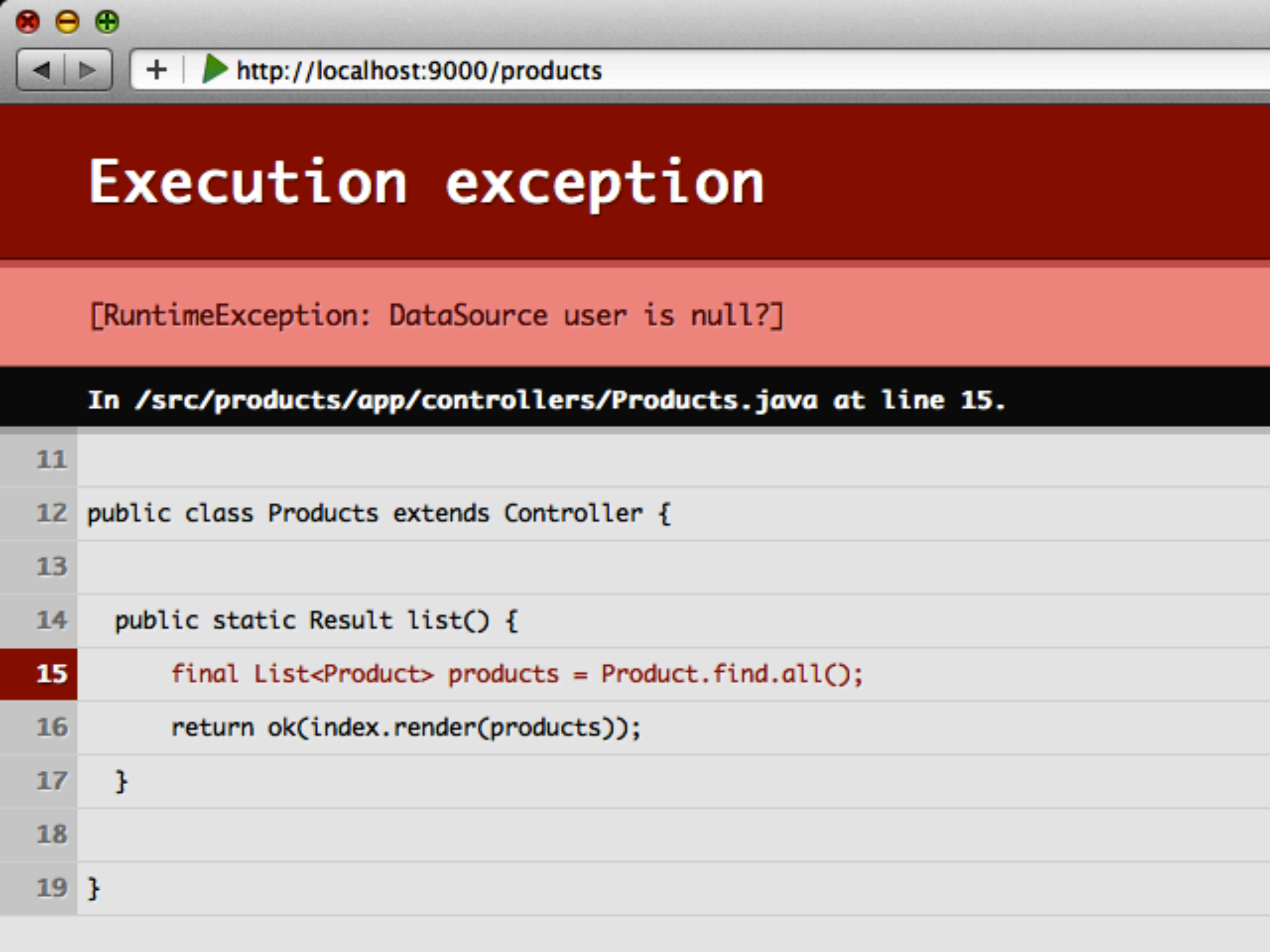
Where's the actual error message?

```
13:07:55,796 ERROR [[PersonServlet]] Servlet.service() for servlet
PersonServlet threw exception
javax.ejb.EJBException: null; CausedByException is:
    null
    at org.jboss.ejb3.tx.Ejb3TxPolicy.handleExceptionInOurTx(Ejb3TxPolicy.java:46)
    at org.jboss.aspects.tx.TxPolicy.invokeInOurTx(TxPolicy.java:70)
    at org.jboss.aspects.tx.TxInterceptor$Required.invoke(TxInterceptor.java:134)
    at org.jboss.aop.joinpoint.MethodInvocation.invokeNext(MethodInvocation.java:98)
    at org.jboss.aspects.tx.TxPropagationInterceptor.invoke(TxPropagationInterceptor.java:61)
    at org.jboss.aop.joinpoint.MethodInvocation.invokeNext(MethodInvocation.java:98)
    at org.jboss.ejb3.stateless.StatelessInstanceInterceptor.invoke(StatelessInstanceInterceptor.java:39)
    at org.jboss.aop.joinpoint.MethodInvocation.invokeNext(MethodInvocation.java:98)
    at org.jboss.aspects.security.AuthenticationInterceptor.invoke(AuthenticationInterceptor.java:63)
    at org.jboss.aop.joinpoint.MethodInvocation.invokeNext(MethodInvocation.java:98)
    at org.jboss.ejb3.ENCPropagationInterceptor.invoke(ENCPropagationInterceptor.java:32)
    at org.jboss.aop.joinpoint.MethodInvocation.invokeNext(MethodInvocation.java:98)
    at org.jboss.ejb3.asynchronous.AsynchronousInterceptor.invoke(AsynchronousInterceptor.java:91)
    at org.jboss.aop.joinpoint.MethodInvocation.invokeNext(MethodInvocation.java:98)
    at org.jboss.ejb3.stateless.StatelessContainer.dynamicInvoke(StatelessContainer.java:189)
    at org.jboss.aop.Dispatcher.invoke(Dispatcher.java:107)
    at org.jboss.ejb3.remoting.IsLocalInterceptor.invoke(IsLocalInterceptor.java:37)
    at org.jboss.aop.joinpoint.MethodInvocation.invokeNext(MethodInvocation.java:98)
    at org.jboss.ejb3.stateless.StatelessRemoteProxy.invoke(StatelessRemoteProxy.java:88)
    at $Proxy76.getAllPeople(Unknown Source)
    at uk.co.mediaport.web.PersonServlet.showTelephones(PersonServlet.java:54)
    at uk.co.mediaport.web.PersonServlet.doPost(PersonServlet.java:45)
    at uk.co.mediaport.web.PersonServlet.doGet(PersonServlet.java:34)
    at javax.servlet.http.HttpServlet.service(HttpServlet.java:697)
    at javax.servlet.http.HttpServlet.service(HttpServlet.java:810)
    at org.apache.catalina.core.ApplicationFilterChain.internalDoFilter(ApplicationFilterChain.java:252)
    at org.apache.catalina.core.ApplicationFilterChain.doFilter(ApplicationFilterChain.java:173)
    at org.jboss.web.tomcat.filters.ReplyHeaderFilter.doFilter(ReplyHeaderFilter.java:81)
    at org.apache.catalina.core.ApplicationFilterChain.internalDoFilter(ApplicationFilterChain.java:202)
    at org.apache.catalina.core.ApplicationFilterChain.doFilter(ApplicationFilterChain.java:173)
    at org.apache.catalina.core.StandardWrapperValve.invoke(StandardWrapperValve.java:213)
    at org.apache.catalina.core.StandardContextValve.invoke(StandardContextValve.java:178)
    at org.jboss.web.tomcat.security.CustomPrincipalValve.invoke(CustomPrincipalValve.java:39)
    at org.jboss.web.tomcat.security.SecurityAssociationValve.invoke(SecurityAssociationValve.java:159)
    at org.jboss.web.tomcat.security.JaccContextValve.invoke(JaccContextValve.java:59)
    at org.apache.catalina.core.StandardHostValve.invoke(StandardHostValve.java:126)
    at org.apache.catalina.valves.ErrorReportValve.invoke(ErrorReportValve.java:105)
    at org.apache.catalina.core.StandardEngineValve.invoke(StandardEngineValve.java:107)
    at org.apache.catalina.connector.CoyoteAdapter.service(CoyoteAdapter.java:148)
    at org.apache.coyote.http11.Http11Processor.process(Http11Processor.java:856)
```

```
at org.apache.coyote.http11.Http11Protocol$Http11Processor.service(Http11Protocol.java:744)
at org.apache.tomcat.util.net.PoolTcpEndpoint.processSocket(PoolTcpEndpoint.java:527)
at org.apache.tomcat.util.net.MasterSlaveWorkerThread.run(MasterSlaveWorkerThread.java:112)
at java.lang.Thread.run(Thread.java:595)
java.lang.NullPointerException
at uk.co.mediaport.core.PeopleBean.getAllPeople(PeopleBean.java:33)
at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
at sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:39)
at sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:25)
at java.lang.reflect.Method.invoke(Method.java:585)
at org.jboss.aop.joinpoint.MethodInvocation.invokeNext(MethodInvocation.java:109)
at org.jboss.ejb3.AllowedOperationsInterceptor.invoke(AllowedOperationsInterceptor.java:32)
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at javax.servlet.http.HttpServlet.service(HttpServlet.java:697)
at javax.servlet.http.HttpServlet.service(HttpServlet.java:810)
at org.apache.catalina.core.ApplicationFilterChain.internalDoFilter(ApplicationFilterChain.java:252)
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at org.jboss.web.tomcat.filters.ReplyHeaderFilter.doFilter(ReplyHeaderFilter.java:81)
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at org.apache.catalina.core.ApplicationFilterChain.doFilter(ApplicationFilterChain.java:173)
at org.apache.catalina.core.StandardWrapperValve.invoke(StandardWrapperValve.java:213)
at org.apache.catalina.core.StandardContextValve.invoke(StandardContextValve.java:178)
at org.jboss.web.tomcat.security.CustomPrincipalValve.invoke(CustomPrincipalValve.java:39)
at org.jboss.web.tomcat.security.SecurityAssociationValve.invoke(SecurityAssociationValve.java:159)
at org.jboss.web.tomcat.security.JaccContextValve.invoke(JaccContextValve.java:59)
at org.apache.catalina.core.StandardHostValve.invoke(StandardHostValve.java:126)
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at org.apache.catalina.core.StandardEngineValve.invoke(StandardEngineValve.java:107)
at org.apache.catalina.connector.CoyoteAdapter.service(CoyoteAdapter.java:148)
```



**Parse error: syntax error, unexpected T_VARIABLE
in /usr/local/www/htdocs/index.php on line 3**



Execution exception

[RuntimeException: DataSource user is null?]

In /src/products/app/controllers/Products.java at line 15.

```
11  
12 public class Products extends Controller {  
13  
14     public static Result list() {  
15         final List<Product> products = Product.find.all();  
16         return ok(index.render(products));  
17     }  
18  
19 }
```

“ Play 2.0 continues the innovation

First-class support for both Java and Scala

Type-safe templates

Compile-time checking

Asynchronous HTTP programming



- Play 2.0 provides parallel APIs for Java and Scala, for example, a controller action:

```
// Java controller action method  
public static Result index(String name) {  
    return ok("Hello" + name);  
}
```

```
// Scala controller action method  
def hello(name: String) = Action {  
    Ok("Hello " + name)  
}
```

“Templates want to be beautiful too

Type safe template parameter declarations

Minimal interference with HTML mark-up

Type-safe template parameters

- Templates include type-safe parameter declarations
- Similar to the lightweight template syntax in Play 1.x
- Templates are compiled into class files for run-time speed

```
@(products: List[Product])  
<ul>  
  @for(product <- products) {  
    <li class="@product.type">@product.name</li>  
  }  
</ul>
```

Template functions

- Play 2.0's template system is based on Scala
- A template is a Scala function that you call from your code

```
// Render the 'Products.list' template in Java code.
```

```
Html html = views.html.Products.list.render(products);
```

```
// e.g. as the result of a controller action method.
```

```
public static Result list() {
```

```
    final List<Product> products = Products.list();
```

```
    return ok(views.html.Products.list.render(products));
```

```
}
```

Template syntax starts with @



Template parameter declaration



```
@(products: List[Product])
```

```
@if(products.isEmpty) {
```

```
  <h1>No products</h1>
```

```
}
```

No delimiter for the end of
a template syntax section


```
@(products: List[Product])
```

```
@if(products.isEmpty) {
```

```
  <h1>No products</h1>
```

```
} else {
```

```
  <h1>@items.size products</h1>
```

```
}
```



Output the value of an expression

Define a 'tag' - output a details page link



```
@display(product: models.Product) = {  
  <a href="@routes.Products.details(product.id)">  
    @product.name  
  </a>  
}
```

```
<ul>  
@for(product <- products) {  
  @display(product)  
}  
</ul>
```



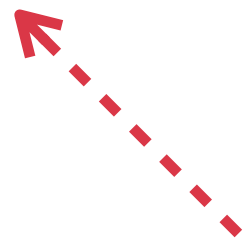
Use the 'display' tag

```
<section class="content">
```

```
...
```

```
</section>
```

```
@footer()
```



Include the 'footer' template
(i.e. call the 'footer' function)

main.scala.html

```
@(title: String)(content: Html)
<!DOCTYPE html>
<html>
  <head>
    <title>@title</title>
  </head>
  <body>
    @content
  </body>
</html>
```

Two parameter lists
(one parameter each)



Define a page layout
template called 'main'

index.scala.html

```
@main("Home page") {
  <h1>Welcome</h1>
}
```

Render the 'main' template,
passing two parameters

“ Dear PHP and Rails developers,
runtime errors make you look bad

Using unit tests to find syntax errors is a hack

There is a solution...

SYNTAX ERRORS?



COMPILE ALL THE THINGS!

Compile-time checking

- Not just Java and Scala classes
 - HTTP routes file (maps URLs to controller actions)
 - Templates
 - JavaScript files (using Google Closure Compiler)
 - CoffeeScript files (alternative to JavaScript)
 - LESS style sheets (alternative to CSS)
- Fewer errors at run-time



controllers/Products.java

```
public class Products extends Controller {  
    public static Result details(final Long id) {  
        return ok();  
    }  
}
```

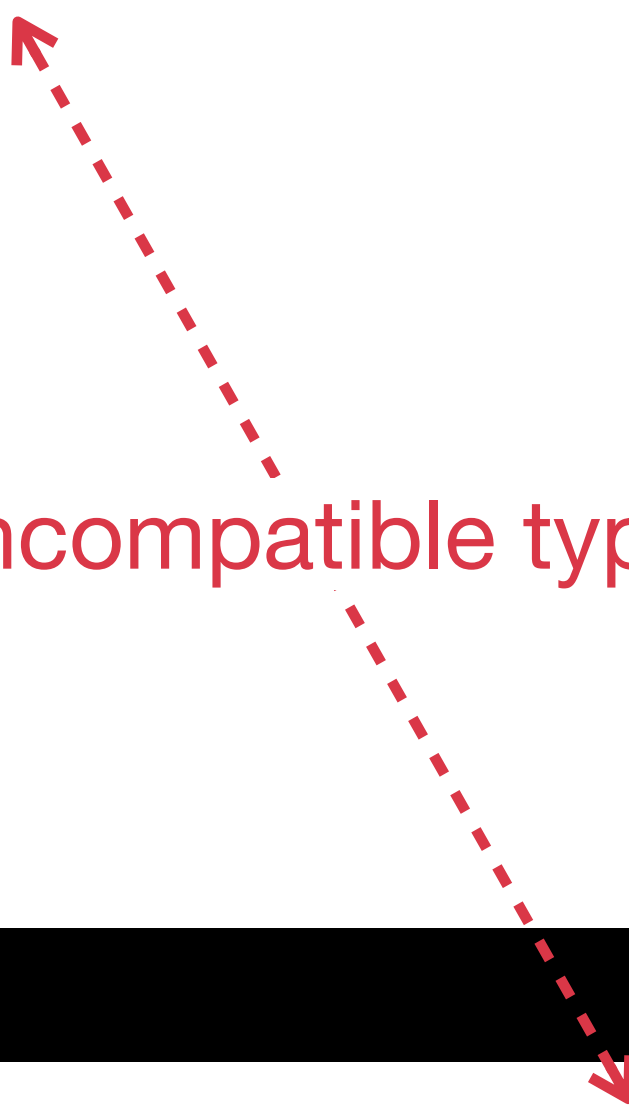
conf/routes

```
GET /product/:id    controllers.Products.details(id: String)
```

controllers/Products.java

```
public class Products extends Controller {  
    public static Result details(final Long id) {  
        return ok();  
    }  
}
```

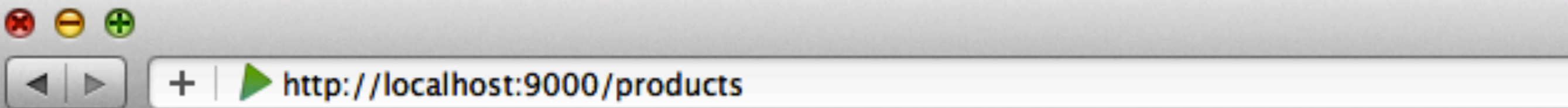
Incompatible types



conf/routes

```
GET /product/:id controllers.Products.details(id: String)
```

```
public class Products extends Controller {  
    public static Result details(final Long id) {  
        return ok();  
    }  
}
```

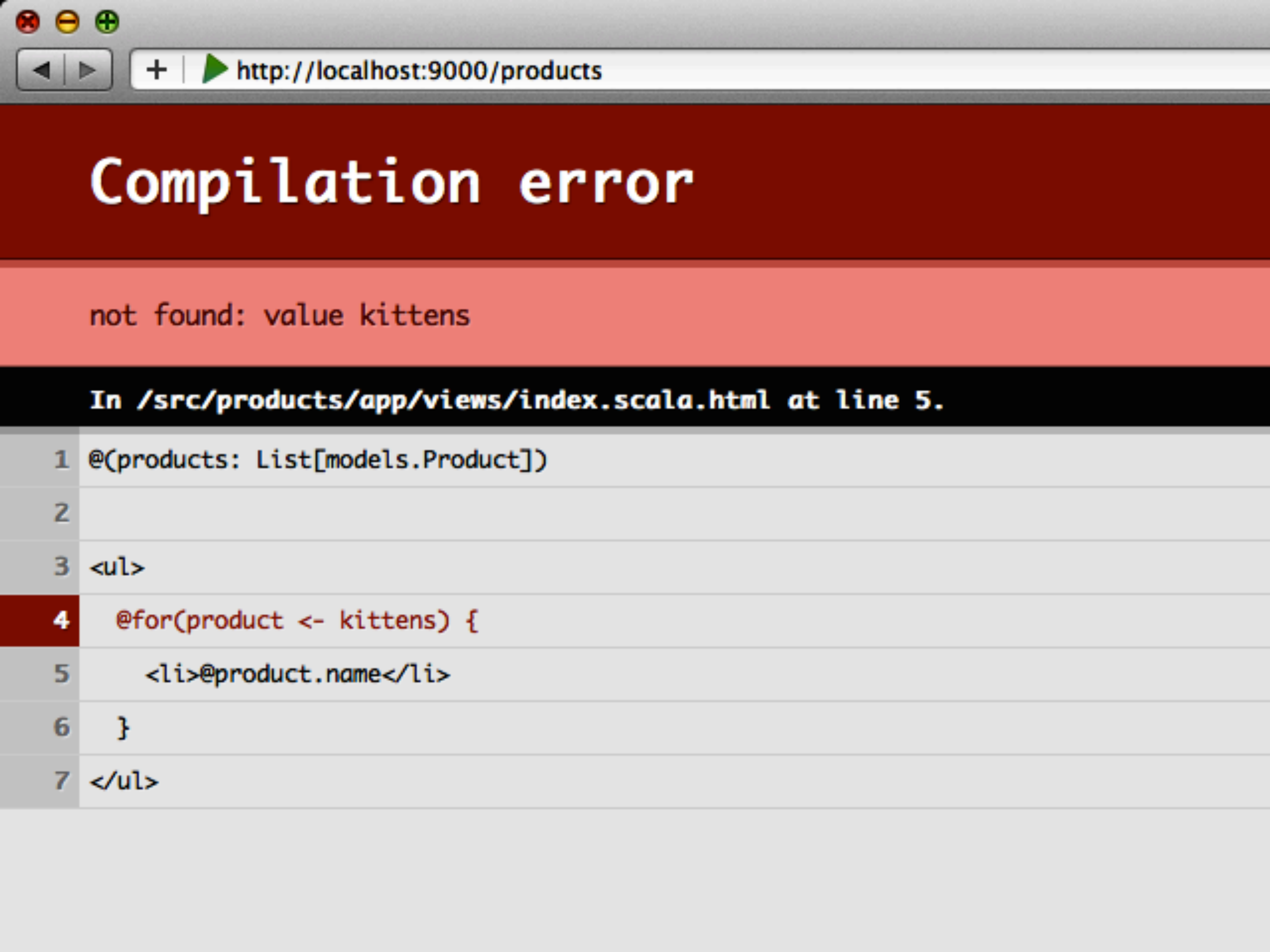


Compilation error

type mismatch; found : String required: java.lang.Long

In /src/products/conf/routes at line 3.

1	GET /products	controllers.Products.list()
2		
3	GET /product/:id	controllers.Products.details(id: String)



http://localhost:9000/products

Compilation error

not found: value kittens

In /src/products/app/views/index.scala.html at line 5.

```
1 @(products: List[models.Product])
2
3 <ul>
4   @for(product <- kittens) {
5     <li>@product.name</li>
6   }
7 </ul>
```




Compilation error

Parse error. missing ; before statement

In /src/products/app/assets/heroisms.js at line 2.

```
1 function saveTheWorld() {  
2   ■ TODO!  
3 }
```

Compilation error

Parse error on line 2: Unexpected 'UNARY'

In /src/products/app/assets/heroisms.coffee at line 2.

```
1 rescue = (kittens) ->
```

```
2   TODO!
```

Compilation error

variable @rainbow is undefined

In /Users/pedro/Documents/code/examples-play/jfokus/app/assets/colours.less

```
1 span.cat {  
2   background: @rainbow;  
3 }
```



```
@rainbow: -webkit-gradient(linear, left top, left bottom,  
    color-stop(0.00, red),  
    color-stop(20%, orange),  
    color-stop(25%, yellow),  
    color-stop(30%, yellow),  
    color-stop(45%, green),  
    color-stop(65%, blue),  
    color-stop(80%, indigo),  
    color-stop(1.00, violet));
```

“ Use HTML5 technologies

Choose a web framework that lets you

Hire or become a front-end expert

Use HTML ‘bricks’ instead of moulded components



HOME BLOG ABOUT CONTACT



DUTCHCELT

Get off my grid!

Grids have become an integral part of design since humans figured out how to print stuff. Grids flourished in the age of reproduction. Discussing the sense and non-sense of grids is something that designers never seem to get tired of. Responsive web design has added an extra dimension to this discussion. That's a good thing because any argument for a grid based approach would also need to take responsive layouts in to account. So, how well do grids hold up on the open web?



Modern web development

- Play is designed to work with HTML5 technologies
- No constraints on HTML output (front-end dev-friendly)
- UI components belong in the client, e.g. JQuery UI
- Built-in support for improvements to CSS and JavaScript:
 - LESS <http://lesscss.org/>
 - CoffeeScript <http://coffeescript.org/>
 - Closure Compiler <http://code.google.com/closure/compiler>



Other Play 2.0 features

- Asynchronous web programming
- Build environment based on sbt
 - Scala REPL (irb eat your heart out)
- Designed for easy cloud deployment, e.g. Heroku
- Persistence - use your favourite framework
 - Ebean (Java) or Anorm (Scala) included with Play
- Test framework integration



Play 2 books

- *Play 2 for Scala*, Peter Hilton, Erik Bakker, Francisco Canedo
<http://bit.ly/playforscala>
- *Play 2 for Java*, Nicolas Leroux, Sietse de Kaper
<http://bit.ly/playjava>
- Early Access (MEAP) editions now available



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