




LUNATECH

Play framework 2.0

Peter Hilton • 14 February 2012

- Senior solution architect and Operations Director at Lunatech Research in Rotterdam, the Netherlands
- Has worked at Lunatech Research since 2004:
 - Web application architecture, design and construction
 - Agile project management
 - Other interests include Drools and functional design
- Play framework committer since 2010
- Co-author of the book *Play 2 with Scala in Action*



I  **PPLAY**

“ Play brings high-productivity web development to the JVM

Presentation goal: explain big ideas in Play 2.0

Outline

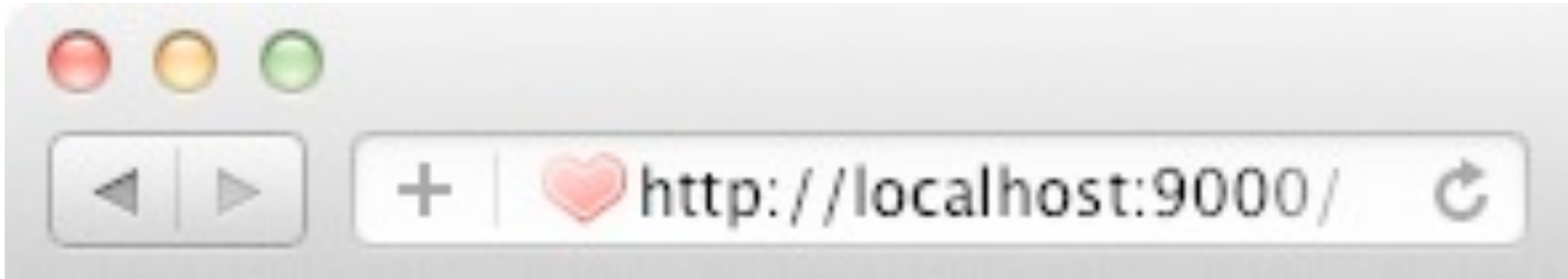
- What Play is and why it matters
- New features in Play 2.0
 - Type-safety
 - Template syntax
 - Compile-time checking
- Play 2.0 with Java and Scala
- Web development 2.0 - integrated third-party stuff



What Play is

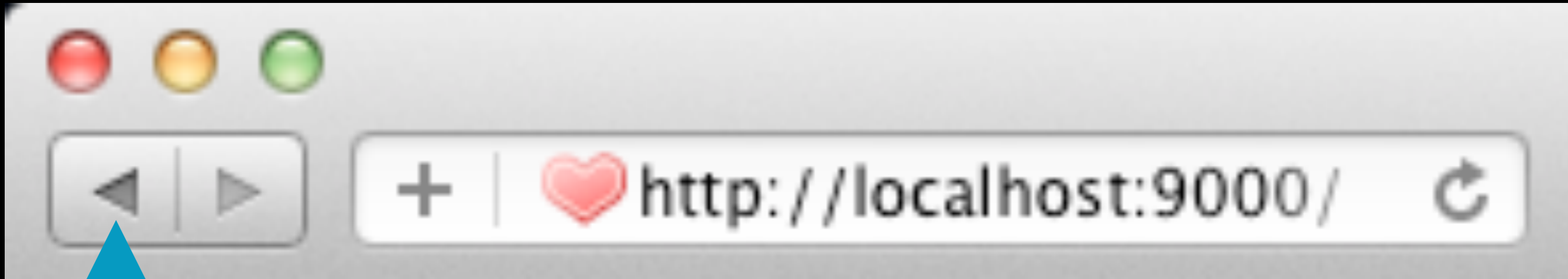
- Full-stack web framework
- Simple, flexible and powerful HTTP interface
- High-productivity web development
- Asynchronous HTTP programming model
- High-performance scalable architecture
- Designed *by* web developers *for* web developers
- Play is fun





“ It’s the web browser, stupid

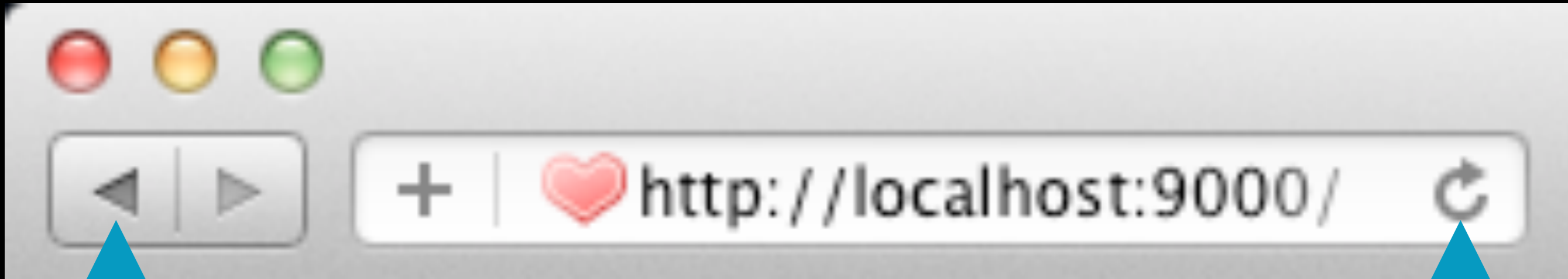
That’s why Play matters



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.



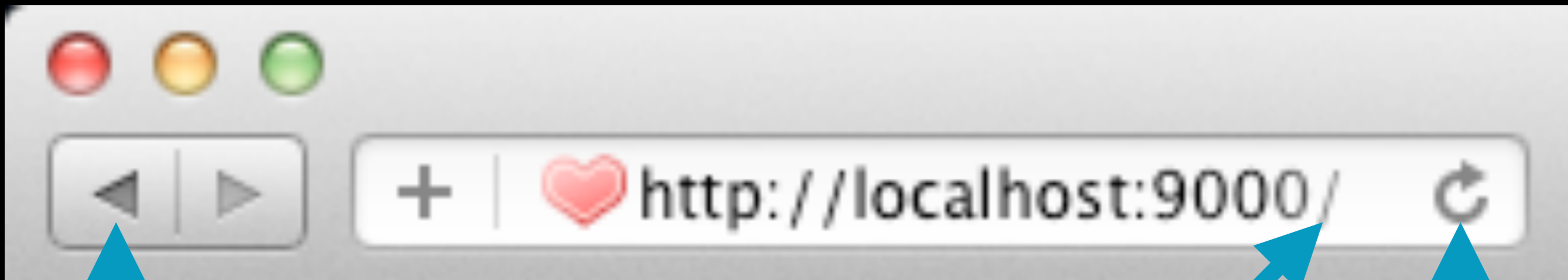
Back
button

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

Reload
button

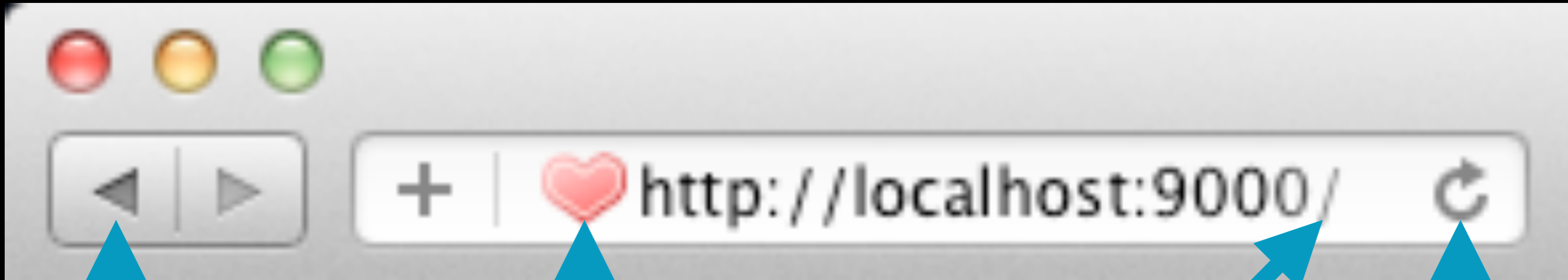
You can use 'clean' URLs:

/products

/product/42

/product/42/comments





Back
button

Usability (DX)

URL

Reload
button

Convenient HTTP API
and template syntax

Clear error messages
and short stack traces



“ Play doesn't fight HTTP or the browser

Stateless, high-productivity, HTTP-centric, usable



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

- Matches the web's stateless HTTP architecture
- Simplifies application development and testing
- Avoids synchronising state between additional layers (state belongs in the client or persistent storage)
- Enables cloud deployment and horizontal scalability



“ For years, PHP and Rails developers
have been laughing at you
... every time they reload a web page

Code reloading

- During development, reload the page to see changes in:
 - Java and Scala classes
 - configuration files
 - templates.
- Play pre-compiled 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/ServletsOnAMoFoPlane?sessionId=x81nj38avngjLOLdxpanewq&action=NextPage&Mykel=Alvis&entityId=12991274&processName=UnladenSwallowComputation&role=peon&date=03%2F01%2F1999&flagSettings=0101000111&returnPage=%2Fvideos%2Frickroll.avi>

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
- Simple to configure your application's URLs in one place:

```
# 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

```
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 would need to be a super-hero to successfully use some web frameworks



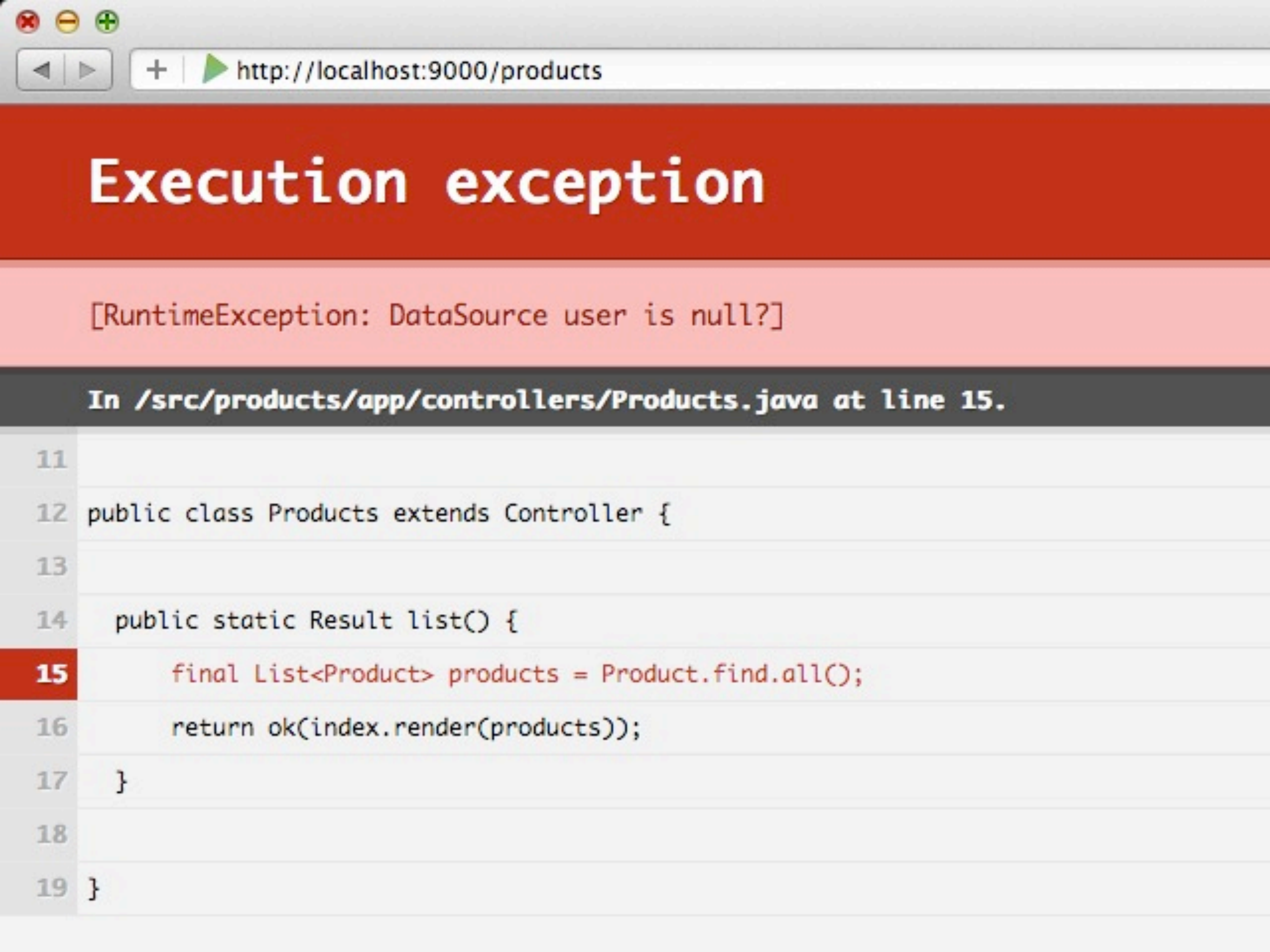
+ |  http://localhost:8080/



... to spot the error

```
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.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$Http11ConnectionHandler.processConnection(Http11Protocol.java:744)
at org.apache.tomcat.util.net.PoolTcpEndpoint.processSocket(PoolTcpEndpoint.java:527)
at org.apache.tomcat.util.net.MasterSlaveWorkerThread.run(MasterSlaveWorkerThread.java:112)
at java.lang.Thread.run(Thread.java:595)
java.lang.NullPointerException
at uk.co.mediaport.core.PeopleBean.getAllPeople(PeopleBean.java:33)
at sun.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
at sun.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:39)
at sun.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:25)
at java.lang.reflect.Method.invoke(Method.java:585)
at org.jboss.aop.joinpoint.MethodInvocation.invokeNext(MethodInvocation.java:109)
at org.jboss.ejb3.AllowedOperationsInterceptor.invoke(AllowedOperationsInterceptor.java:32)
at org.jboss.aop.joinpoint.MethodInvocation.invokeNext(MethodInvocation.java:98)
at org.jboss.aspects.tx.TxPolicy.invokeInOurTx(TxPolicy.java:66)
at org.jboss.aspects.tx.TxInterceptor$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)
```


A screenshot of a web browser window. The address bar shows 'http://localhost:9000/products'. The main content area has a red background with the text 'Execution exception'. Below this, a light pink box contains the error message '[RuntimeException: DataSource user is null?]', and a dark grey box below that says 'In /src/products/app/controllers/Products.java at line 15.'. At the bottom, a code editor shows the source code for 'Products.java', with line 15 highlighted in red. The code defines a 'Products' class extending 'Controller' with a 'list()' method that calls 'Product.find.all()' and renders the results.

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

“ Diversity matters - now there’s Java *and* Scala



Play in Java and Scala

- Play 2.0 introduces 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)
}
```

Play 2.0 Scala implementation

- Play 2.0 is itself implemented in Scala
- Scala removes the need for so much byte code enhancement in the Java API
 - There is less 'magic' and strangeness in the API
 - The code you see in the IDE is the code that runs
- Scala source code not necessarily harder to read



- Play 2.0's template system is based on Scala
- A template is a Scala function

```
// Render a 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));  
}
```

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: Seq[Product])  
  
<ul>  
  @for(product <- products) {  
    <li>@product.name</li>  
  }  
</ul>  
  
@summary(products)
```

@* if statements *@

```
@if(products.isEmpty) {  
    <h1>No products</h1>  
} else {  
    <h1>@items.size products</h1>  
}
```


Links (reverse routing) and tags

```
@* Define a 'tag' - output a details page link *@
@display(product: models.Product) = {
  <a href="@routes.Products.details(product.id)">
    @product.name
  </a>
}
```

```
@* Use the 'details' tag *@
<ul>
@for(product <- products) {
  @display(product)
}
</ul>
```

Template composition

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

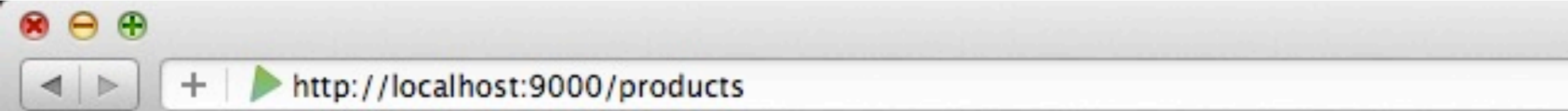
```
@main("Home page") {
  <h1>Welcome</h1>
}
```

Compile-time checking

- Not just Java and Scala classes
 - HTTP routes file (maps requests 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



```
public class Products extends Controller {  
  
    //                                Not a String!  
    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)
```

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.nyan.cat {  
2   background-color: @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));
```

“ HTML5 - use it... or I'll drown the kittens!



Web development 2.0

- Designed to work with HTML5
- 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 features

- Build environment based on sbt
 - to do: test REPL (irb eat your heart out)
- Asynchronous controller API (web sockets)
- Designed for easy cloud deployment, e.g. Heroku
- Persistence via Ebean (Java) or Anorm (Scala)
- Test framework integration



Forthcoming books

- *Play 2 with Scala in Action*,
Peter Hilton, Erik Bakker, Francisco Canedo
- *Play 2 with Java in Action*,
Nicolas Leroux, Sietse de Kaper
- Both books due for publication later this year
- Manning Early Access Program (MEAP) ‘next month’



@PeterHilton

www.lunatech.com

@PlayFramework

www.playframework.org



LUNATECH