Tapestry

Code less, deliver more.

Rayland Jeans

What is Apache Tapestry?

- Apache Tapestry is an open-source framework designed to create scalable web applications in Java.
- Tapestry allows developers to create web applications that are a set of pages constructed from components.
- Tapestry is designed specifically to make creating new components easy.
- Simplifies configuration by removing the need for XML and promotes the use of Java annotations and naming conventions.

What is Apache Tapestry?

- Written in Pure Java so pages and components can be written in Java, Groovy or Scala.
- Provides the ability to add new modules using an IoC container.
- Contains built-in support for Ajax and Javascript.
- Provides support for easily unit testing pages and components.

Adaptive API

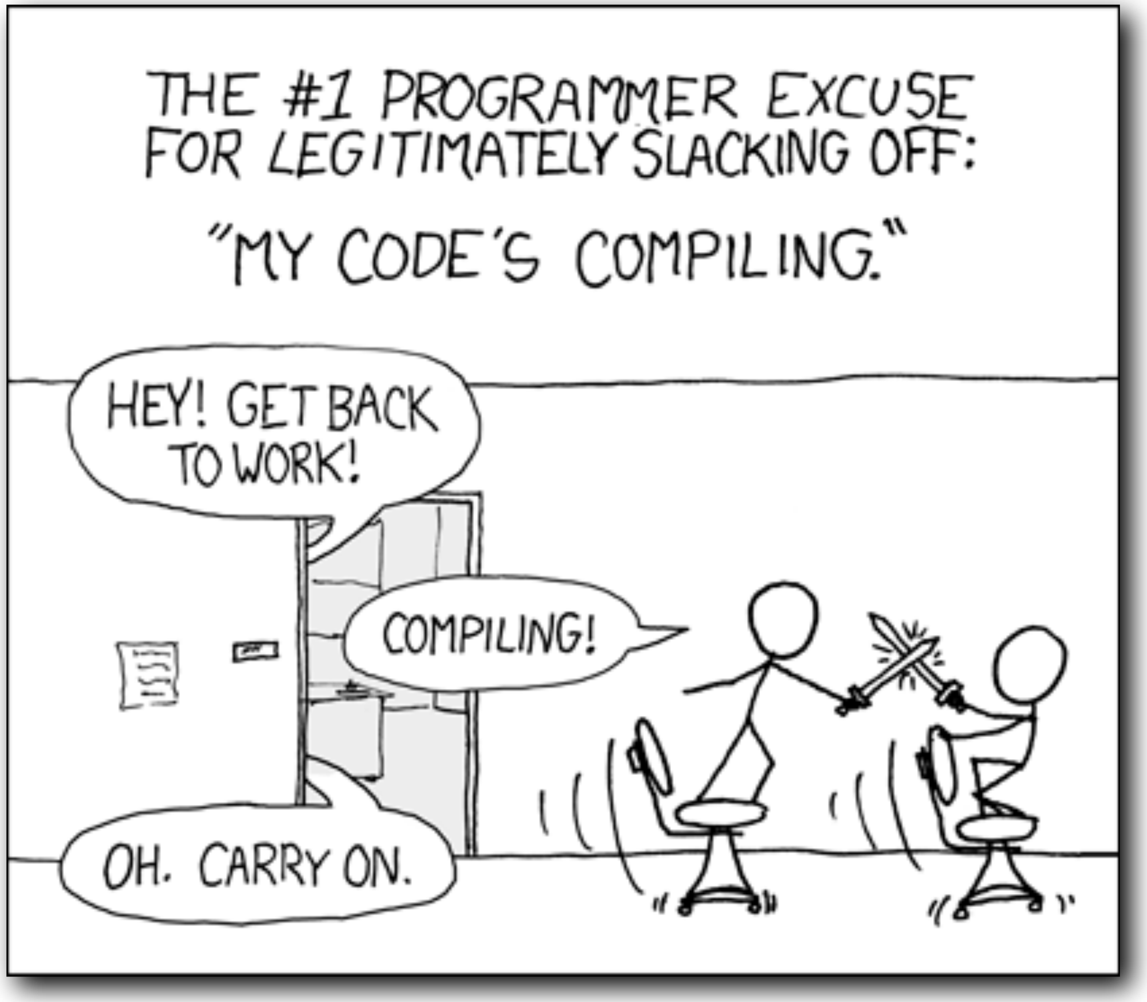
- A statement made on the Tapestry web site
  - http://tapestry.apache.org
- ***"In traditional Java frameworks, including Tapestry 4, user code is expected to conform to the framework.***
  - *You create classes that extend from framework-provided base classes, or implement framework-provided interfaces.*
  - *This works well until you upgrade to the next release of the framework*
  - *Interfaces or base classes will have changed and your existing code will need to be changed to match.*
- ***In Tapestry 5, the framework adapts to your code.***
  - *You have control over the names of the methods, the parameters they take, and the value that is returned.*
  - *This is driven by annotations, which tell Tapestry under what circumstances your methods are to be invoked."*

Features of Tapestry

- Tapestry 5 has many features. These are the features that will be covered in this presentation.
    - Live class reloading.
    - Convention over Configuration
    - Pages and Components
    - Advanced Exception Reporting
    - Inversion of Control Container
    - Ajax and JavaScript support

Live Class Reloading

- Most Java web application frameworks require you to restart the web server when a change is made to a Java class.



http://xkcd.com/303/

Live Class Reloading

- Tapestry provides automatic reloading of page classes and templates.
  - On a change of any class within a controlled package, Tapestry will discard and reload all page instances and the class loader.
  - This does not affect data stored in the session.
  - This allows developers to make changes while the application is running.
  - This also allows developers to focus more on the application being developed and not the web server hosting the application.

Convention over Configuration

- No XML config files
  - Most older Java web frameworks require the use of XML for configuration.
  - Tapestry uses Java annotations for almost all of its configuration.
  - In addition to annotations, Tapestry makes use of naming conventions for configuration, such as:
    - Method names
    - Class names
    - Package names

Configuration

- So if there are no XML configuration files, how do you configure Tapestry?
- Since Tapestry is designed to run in a servlet container like Apache Tomcat or Jetty, you do need to configure the servlet deployment descriptor (web.xml).
    - Specific configurations required are:
        - tapestry.app-package
        - Tapestry filter
        - Filter mapping
    - This is sort of where configuration stops and convention takes over.

Configuring Tapestry

Application Deployment Descriptor (web.xml)

```
<!DOCTYPE web-app
      PUBLIC "-//Sun Microsystems, Inc.//DTD Web Application 2.3//EN"
"http://java.sun.com/dtd/web-app_2_3.dtd">
<web-app>
    <display-name>My Tapestry Application</display-name>
    <context-param>
        <param-name>tapestry.app-package</param-name>
        <param-value>com.sample.app</param-value>
    </context-param>
    <filter>
        <filter-name>app</filter-name>
        <filter-class>org.apache.tapestry5.TapestryFilter</filter-
class>
    </filter>
    <filter-mapping>
        <filter-name>app</filter-name>
        <url-pattern>/*</url-pattern>
    </filter-mapping>
</web-app>
```

Configuring Tapestry

```xml
<context-param>
    <param-name>tapestry.app-package</param-name>
    <param-value>com.sample.app</param-value>
</context-param
```

- `tapestry.app-package` defines the location of your Page files and your Component files.
  - Tapestry will use naming conventions to determine where Pages and Components are placed within your application
  - According to the tapestry.app-package setting above, Pages can be found in *`com.sample.app`*.**`pages`** and Components can be found in *`com.sample.app`*.**`components`**

Configuring Tapestry

```
<filter>
    <filter-name>app</filter-name>
    <filter-class>org.apache.tapestry5.TapestryFilter</filter-class>
</filter>
```

- Application Module Class
  - The application module class defines new services, provides overrides of services or makes contributions to service configurations.
  - Using naming conventions, Tapestry looks for the application module class under the root package of the application. In this case, Tapestry will look in *`com.sample.app.`***`services`** for the **`App`**`Module` class.

Pages and Components

- Pages and Components are used to generate the view portion of the application. They replace Servlets and JSPs in traditional Java web apps.
- Pages and Components are Plain Old Java Objects.
  - No super-class to inherit.
    - Most older Java web frameworks require that you inherit from some base super class.
  - No Interfaces to implement.
  - Components for Tapestry instead use annotations to eliminate the need for inheritance, or interfaces.
  - Naming conventions are also used to eliminate the need for any XML configuration.

Pages and Components

- Tapestry does not use servlets or require a base action class to handle requests. Instead Tapestry uses instances of Page classes and assigns an instance of a page to the thread handling the request.
- Pages and components are ordinary objects, complete with instances variables.
    - With traditional Java web apps that use Servlets, a single instance is created to handle all incoming requests. This means that the Servlet will usually have to be stateless, and instance variables are often of no use.
    - The statelessness requires the use of HttpServletRequest objects to store data per-request and HttpSession objects to store data between requests.
    - Instead of servlets, Tapestry uses a page pool, reserving page instances to particular threads.
    - Pages instance variables are purged and returned back to their default value at the end of the request.

Pages and Components

- Pages are stored in a page pool based on keys.
  - Keys are a combination of the page name and the locale used for that page. For example, the start page used for the "en" would be keyed off of "start" and "en".
  - The number of instances of a page is configurable.
    - Configurations include defining a soft limit and a hard limit of pages to be instantiated.
  - When a pages is accessed, Tapestry will check to see of the soft limit has been reached. If it has, then Tapestry will wait for a short period for a page instance to become available before trying to instantiate a new instance.
  - If the hard limit is reached, then Tapestry will throw an exception, rather than create a new instance.
  - Limits are per-page per-locale. So there could be 20 instances of page "start" for locale "en" and 20 instances for locale "fr".

Pages and Components

- Component classes are the classes associated with a Page. Even though a Page is also a Component, a Page will usually contain one or more Components.
- Each component class will usually have a corresponding component template.
  - Component templates contain markup to a page.
    - However, components do not require a component template to generate markup. In this case, the class would be required to generate the required markup for the request.
- There are a few constraints on component classes:
  - The classes must be public.
  - The classes must be in the correct package.
  - The class must have a default no-argument constructor.

Pages and Components

- What’s the difference between a page and a component?
  - A page is simply a component that acts as the root component for a page’s component tree.
  - A page usually consists of a Java class, a page template and a sometimes a collection of components.
  - A component consists of just a Java class and a component template.
    - A component can also consist of several other components.
  - A page must exist in the pages package:
    - com.example.pages.Index.java
  - A component must exist in the components package
    - com.example.components.IndexComponent.java

Pages and Components

A basic Page example

Page Class

```
package com.example.pages;

import org.apache.tapestry5.annotations.InjectComponent;
import org.apache.tapestry5.annotations.Persist;
import org.apache.tapestry5.annotations.Property;
import org.apache.tapestry5.corelib.components.Zone;

public class Index {
    @Property
    @Persist
    private int clickCount;

    @InjectComponent
    private Zone counterZone;

    Object onActionFromClicker() {
        clickCount++;

        return counterZone.getBody();
    }
}
```

Page Template

```
<div>
    <t:zone t:id="counterZone" id="counterZone">
        <p>You have clicked the link
                            ${clickCount} times.</p>

    </t:zone>

    <p>
    <t:actionlink t:id="clicker" zone="counterZone">
        increment the count
    </t:actionlink>
    </p>
</div>
```

Pages and Components

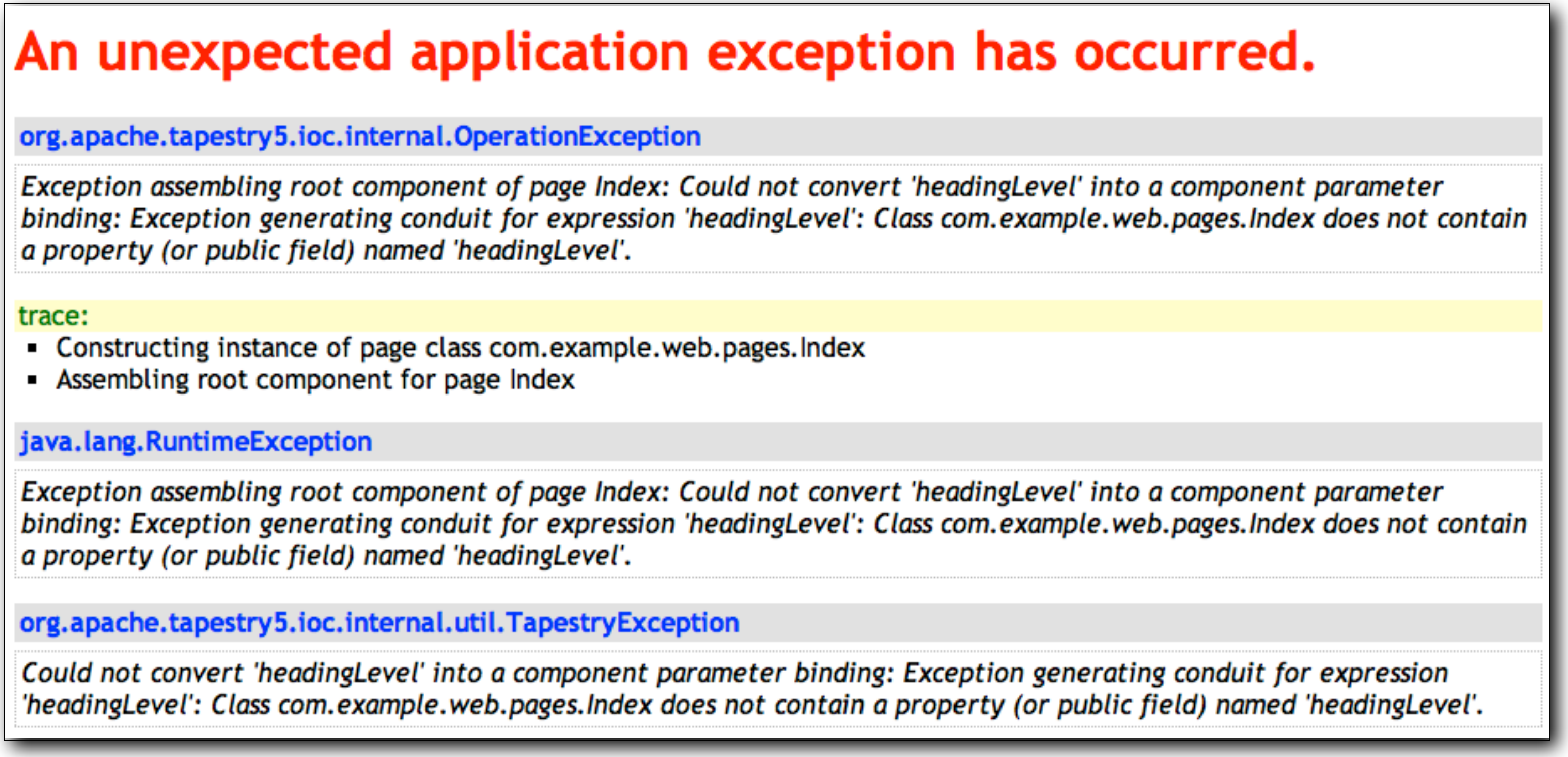
- So what is the benefit of Pages and Components vs. using Servlets?
  - No configuration files required. Tapestry uses naming conventions to determine where your pages and components are and when to instantiate them.
  - Pages are just Java objects. No need to inherit a base class or override any super class methods.
  - Easy access to many of Tapestry's built-in features
    - Ajax support
    - IoC container
    - Data persistence
    - Live class reloading

Advanced Exception Reporting

- With Tapestry there are no cryptic exceptions to interpret.
- Tapestry provides as much information about an exception that was found at runtime.
  - The information given about an exception is more than just a stack trace.
  - Exception messages include:
    - What was Tapestry doing?
    - Why it was doing it?
    - What went wrong?
    - Where was the problem found?
  - Tapestry also tries to suggests available alternatives.

Advanced Exception Reporting

- What went wrong and what was Tapestry doing?
  - Exception messages give plenty of information to be used for debugging.



An unexpected application exception has occurred.

org.apache.tapestry5.ioc.internal.OperationException

Exception assembling root component of page Index: Could not convert 'headingLevel' into a component parameter binding: Exception generating conduit for expression 'headingLevel': Class com.example.web.pages.Index does not contain a property (or public field) named 'headingLevel'.

trace:

- Constructing instance of page class com.example.web.pages.Index
- Assembling root component for page Index

java.lang.RuntimeException

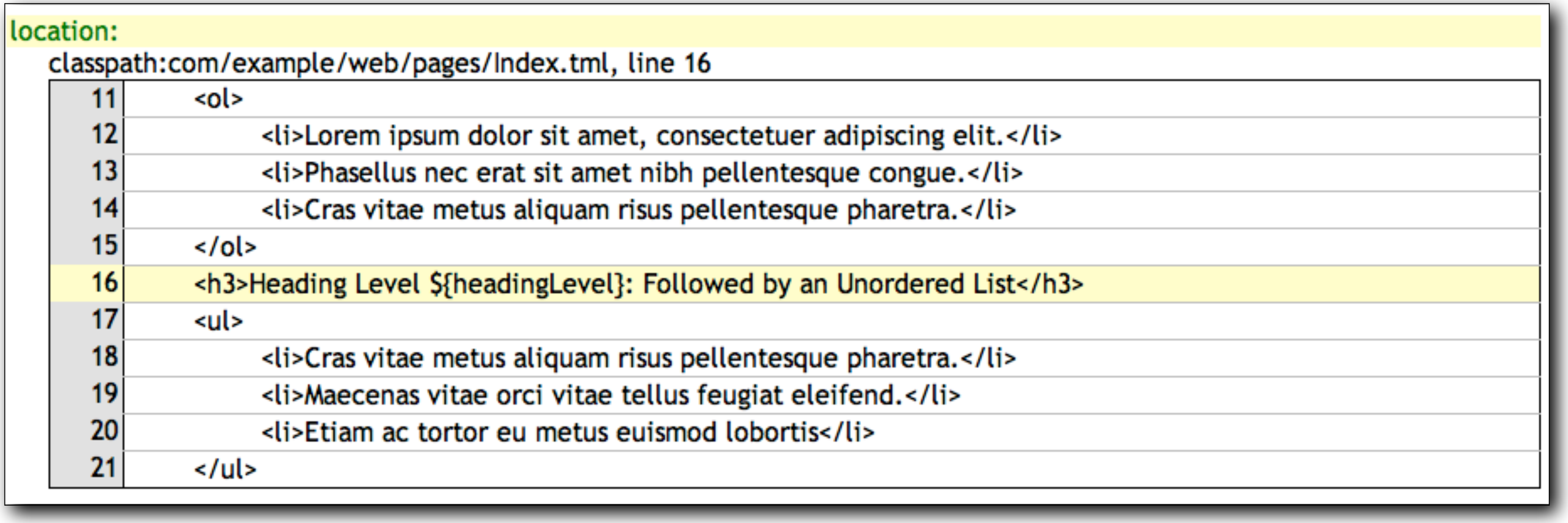
Exception assembling root component of page Index: Could not convert 'headingLevel' into a component parameter binding: Exception generating conduit for expression 'headingLevel': Class com.example.web.pages.Index does not contain a property (or public field) named 'headingLevel'.

org.apache.tapestry5.ioc.internal.util.TapestryException

Could not convert 'headingLevel' into a component parameter binding: Exception generating conduit for expression 'headingLevel': Class com.example.web.pages.Index does not contain a property (or public field) named 'headingLevel'.

Advanced Exception Reporting

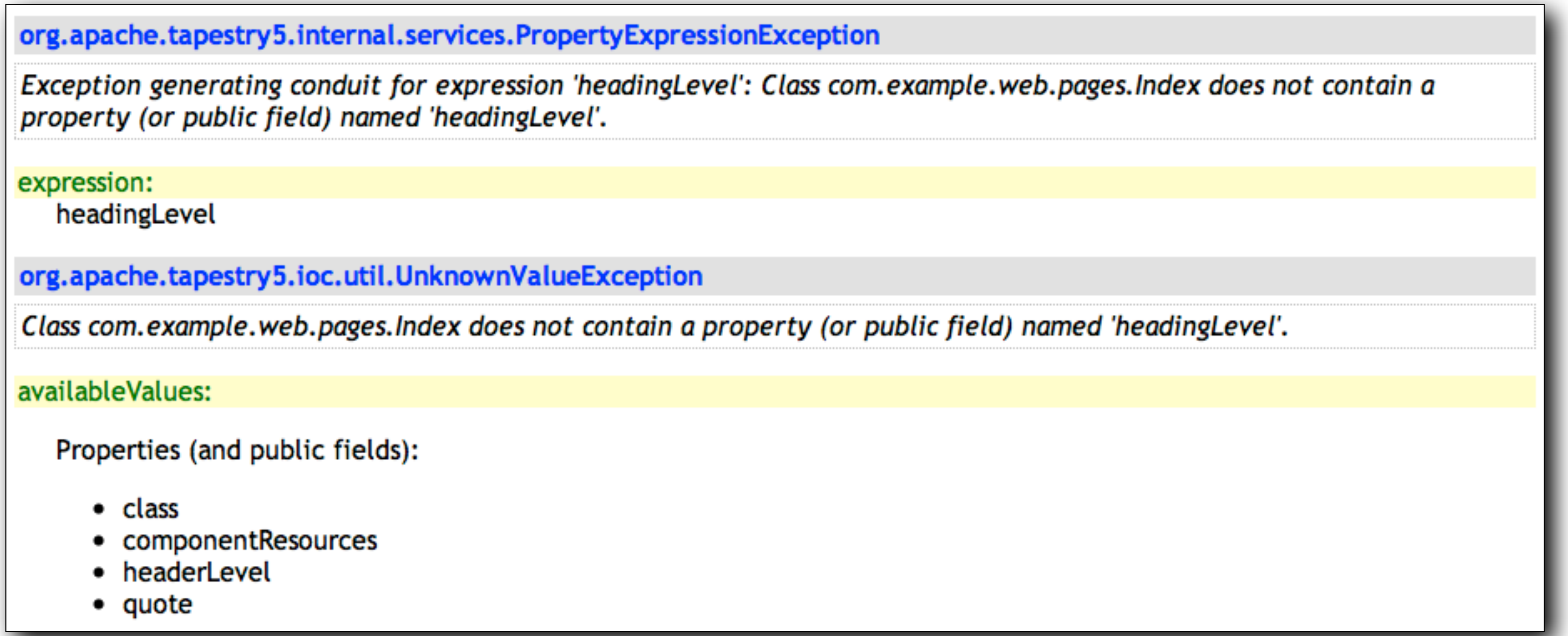
- Where was the problem found?
  - Exception messages include the code and line number were the error was found.



```
location:
    classpath:com/example/web/pages/Index.tml, line 16
11      <ol>
12          <li>Lorem ipsum dolor sit amet, consectetuer adipiscing elit.</li>
13          <li>Phasellus nec erat sit amet nibh pellentesque congue.</li>
14          <li>Cras vitae metus aliquam risus pellentesque pharetra.</li>
15      </ol>
16      <h3>Heading Level ${headingLevel}: Followed by an Unordered List</h3>
17      <ul>
18          <li>Cras vitae metus aliquam risus pellentesque pharetra.</li>
19          <li>Maecenas vitae orci vitae tellus feugiat eleifend.</li>
20          <li>Etiam ac tortor eu metus euismod lobortis</li>
21      </ul>
```

Advanced Exception Reporting

- Suggests available alternatives.
  - Exception messages include suggestions of values that could be used to fix the exception.
  - In this case, the expression used was *headingLevel* but the exception lists *headerLevel* as a possible alternative.



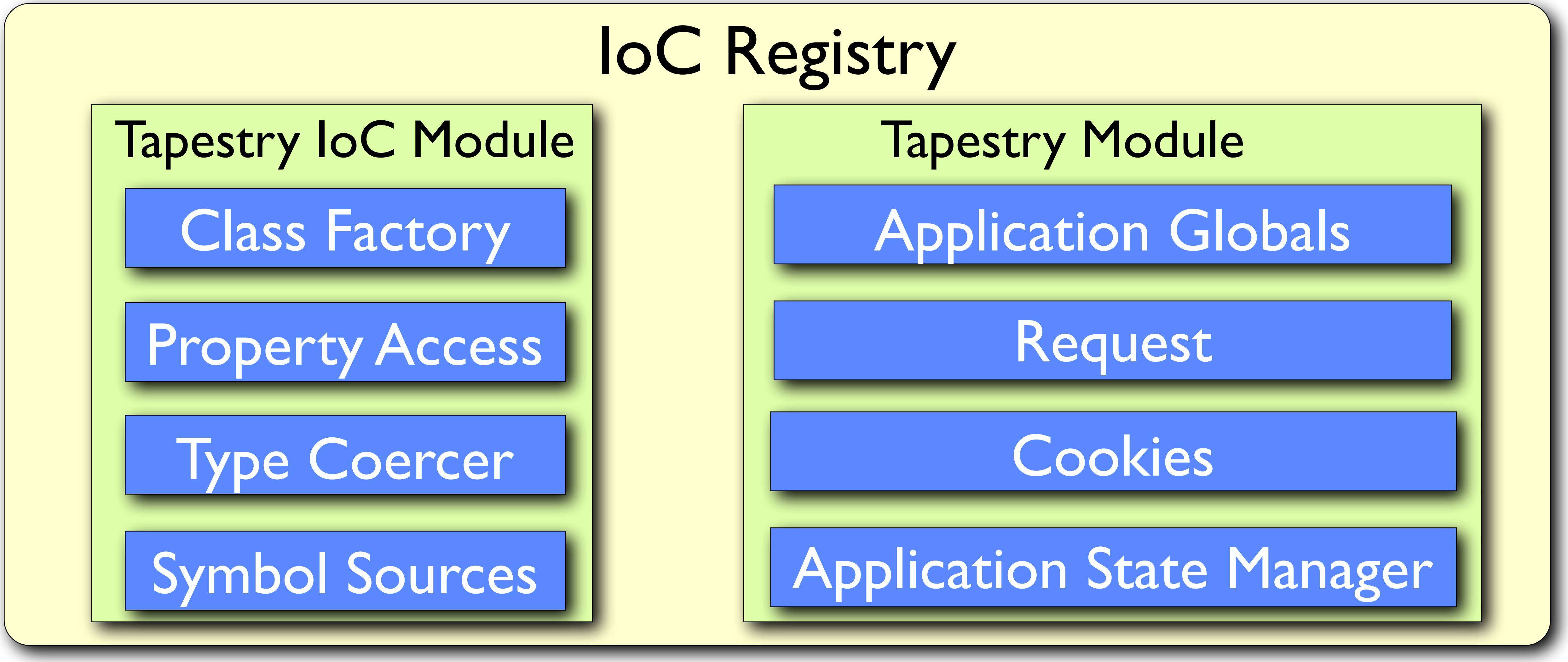
```
org.apache.tapestry5.internal.services.PropertyExpressionException
Exception generating conduit for expression 'headingLevel': Class com.example.web.pages.Index does not contain a
property (or public field) named 'headingLevel'.

expression:
    headingLevel
org.apache.tapestry5.ioc.util.UnknownValueException
Class com.example.web.pages.Index does not contain a property (or public field) named 'headingLevel'.

availableValues:

    Properties (and public fields):

      • class
      • componentResources
      • headerLevel
      • quote
```

Tapestry Inversion of Control Container

- Tapestry contains an IoC package created with the developer in mind.
  - Designed to be easy to use and understand.
    - Does not require verbose XML configuration files.
      - This can be a bit confusing if you're used to IoC containers such as older versions of Spring.
  - Exists specifically to address the need to add functionality while balancing the need to test and maintain existing code.
    - The IoC container provides a way to add new services to the application and make those services easier to test.
  - Provides a way to convert large, complicated blocks into small testable pieces.

Tapestry Inversion of Control Container

- Tapestry IoC Container is made up of a Registry that provides services to modules within a Tapestry application.
  - The Registry contains services from the built-in IoC modules and services from the web framework module.

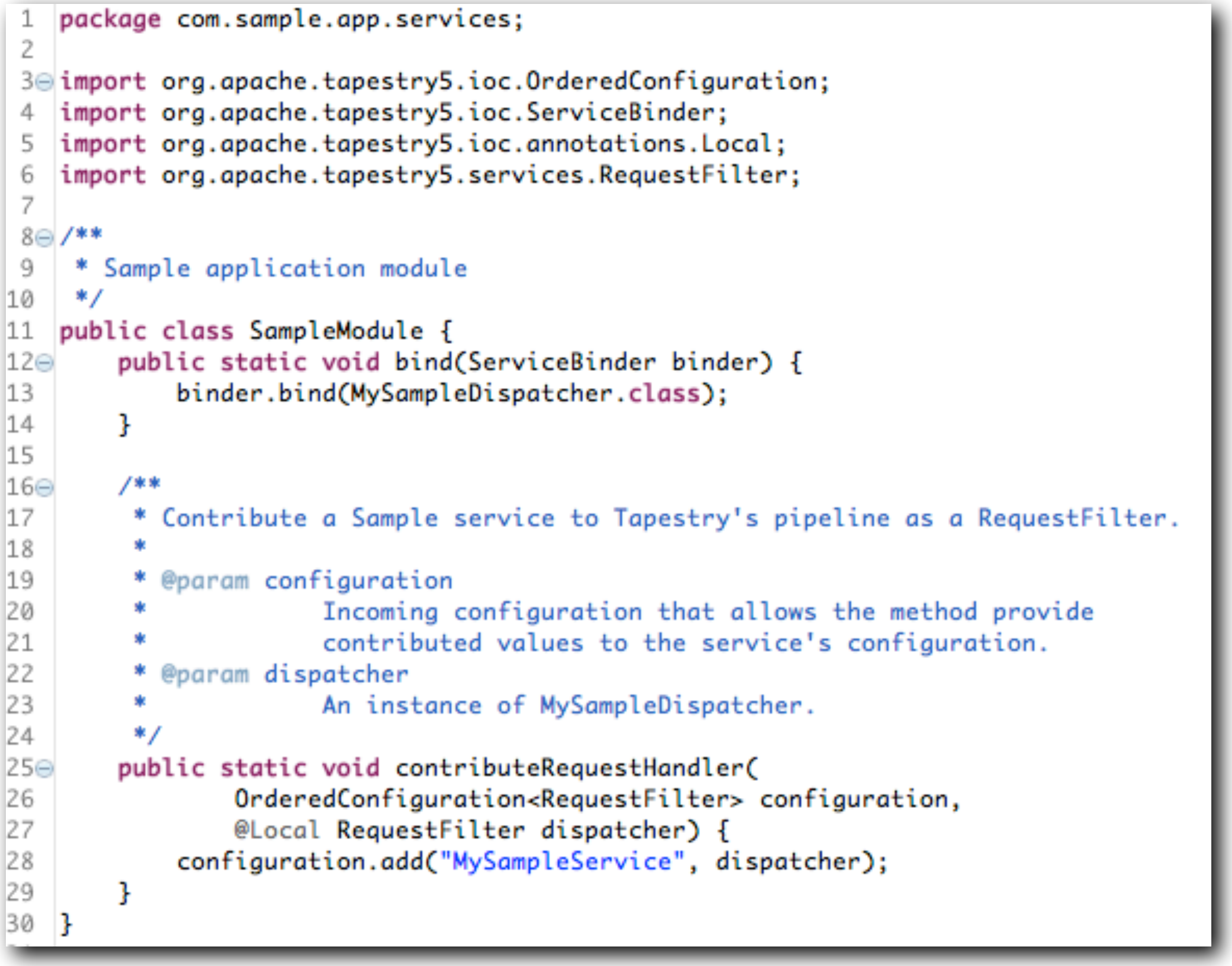


Tapestry Inversion of Control Container

- Tapestry services are lazy.
    - They are not fully instantiated until they are needed.
    - A service is actually a proxy. The first time a method on the proxy is invoked, the service is instantiated.
        - Tapestry refers to this as the service being realized.
- The IoC container is also how developers would add new services to a Tapestry application.
    - All that is needed is the application define the new service to Tapestry to make it available using the AppModule class.

Tapestry Inversion of Control Container

- Example Application Module class.



```java
package com.sample.app.services;

import org.apache.tapestry5.ioc.OrderedConfiguration;
import org.apache.tapestry5.ioc.ServiceBinder;
import org.apache.tapestry5.ioc.annotations.Local;
import org.apache.tapestry5.services.RequestFilter;

/**
 * Sample application module
 */
public class SampleModule {
    public static void bind(ServiceBinder binder) {
        binder.bind(MySampleDispatcher.class);
    }

    /**
     * Contribute a Sample service to Tapestry's pipeline as a RequestFilter.
     *
     * @param configuration
     *            Incoming configuration that allows the method provide
     *            contributed values to the service's configuration.
     * @param dispatcher
     *            An instance of MySampleDispatcher.
     */
    public static void contributeRequestHandler(
            OrderedConfiguration<RequestFilter> configuration,
            @Local RequestFilter dispatcher) {
        configuration.add("MySampleService", dispatcher);
    }
}
```

Tapestry Inversion of Control Container

- Tapestry IoC promotes coding to an interface over coding to an implementation.
  - Tapestry promotes IoC techniques that lead to applications that are:
    - More testable
    - More robust
    - More scalable
    - Easier to maintain
    - Easier to extend
  - The separation between interface and implementation allows developers to work on the same code base, lowering the risk of interference and conflict.

Ajax and JavaScript support

- In Tapestry, JavaScript is referred to as a first-class concept where sophisticated support is provided right out of the box.
  - In production mode, Tapestry will take advantage of browser caching and automatically minify JavaScript libraries.
  - Tapestry comes with Prototype and Scriptaculous. Another version of tapestry, hosted on Github comes with JQuery and JQueryUI.
  - Provides an @Import annotation to add additional JavaScript libraries from within your Java code.
    - CSS can also be imported using this annotation.
    - You can still use the <script> tags, but Tapestry prefers using the annotations.
- Tapestry also provides support for Ajax using built-in components and component mixins.
  - A Component mixin is a way to add additional functionality to a built-in component.

Ajax and JavaScript support

- Tapestry provides Ajax support through an approach known as Zones.
- A Zone allows a way for Tapestry to perform partial page updates.
    - A Zone typically is used to update a <div> element with a page.
    - In most cases, a Zone is a wrapper for dynamic content.
    - A server side event handler is responsible for returning the content to be rendered.
    - A Zone update is usually triggered by an ActionLink, an EventLink or by a Form.
    - A Zone allows developers a way to implement Ajax updates without being required to write any JavaScript.
        - This speeds up development of simple page updates.

Ajax and JavaScript support

A Zone example

Zone

```
<div>
    <t:zone t:id="counterZone" id="counterZone">
        <p>You have clicked the link
                         ${clickCount} times.</p>

    </t:zone>

    <p>
    <t:actionlink t:id="clicker" zone="counterZone">
        increment the count
    </t:actionlink>
    </p>
</div>
```

Action Link

Event Handler method

```
package com.example.pages;

import org.apache.tapestry5.annotations.InjectComponent;
import org.apache.tapestry5.annotations.Persist;
import org.apache.tapestry5.annotations.Property;
import org.apache.tapestry5.corelib.components.Zone;

public class Index {
    @Property
    @Persist
    private int clickCount;

    @InjectComponent
    private Zone counterZone;

    Object onActionFromClicker() {
        clickCount++;

        return counterZone.getBody();
    }
}
```

The disadvantages of using Tapestry

- So after a basic introduction to Tapestry, what are the drawbacks?
  - As mentioned on the Tapestry website, there is not a lot of learning to work with Tapestry, instead there is a lot of unlearning.
    - You would have to try to put aside everything you've learned about writing Java web applications using Servlets and JSP's.
    - If you are migrating from an existing framework, such as Struts, there may need to be some redesign in the code to migrate existing code to work in Tapestry.
  - The current version of Tapestry ships with the Prototype Javascript library. This could make it difficult to work with other libraries such as JQuery.
  - If your URL's require a specific format, Tapestry may get in the way and make it difficult to generate the URL content required.

The advantages of using Tapestry

- Tapestry does a lot of the heavy lifting when it comes to developing a Java web application.
  - Tapestry was created with developer in mind.
- Easy integration of Spring and Hibernate.
  - Tapestry comes with built-in modules that make integrating Spring and Hibernate easy.
- Tapestry supports developing web applications across a team of developers by allowing developers to write clean Java code for pages and components
  - No need to write Servlets and large XML configuration files.
- Tapestry templates are easily viewable using WYSIWYG editor.

Improved Developer Productivity

- Java web developers that do not spend most of their time developing web GUIs often spend most of their GUI development time trying to figure out or re-learn how the framework works.
    - This can be challenging, especially when several weeks or months have passed since the last web development task.
    - Configuration is usually what makes most web development tasks difficult and time consuming.
    - With annotations and naming conventions, most of the time consumed by configuration is removed, which leaves more time to write code.
    - Tapestry allows developers to focus on the tasks required for the business and not get distracted by the framework.

Overview of Tapestry

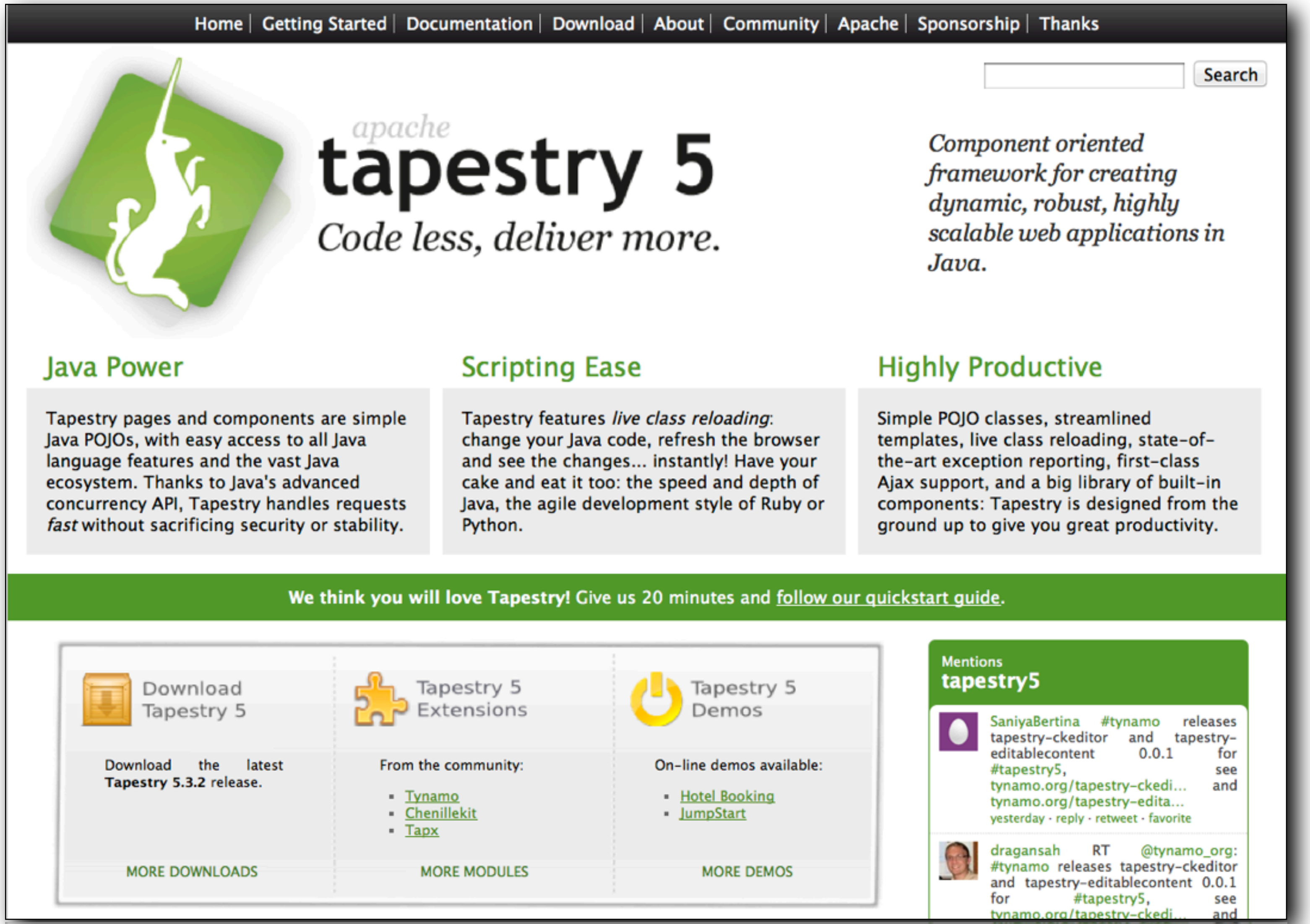
- Tapestry emphasizes convention over configuration.
- Designed with the developer in mind.
  - Focusing on improved productivity.
- Takes a different approach to creating Java web applications than other Java web frameworks.
- Provides the capability to create scalable applications using the built-in Inversion of Control container.
- Contains built-in support for Ajax and JavaScript.

More information on Tapestry

- There are plenty of features not discussed in this presentation such as:
  - Forms and Beans
  - Internationalization
  - Logging, Debugging and Testing
  - Module loading and more

- Descriptions of these features can be found on the Tapestry 5 website.

More information on Tapestry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tapestry 5

Code less, deliver more.

Component oriented framework for creating dynamic, robust, highly scalable web applications in Java.

Java Power

Tapestry pages and components are simple Java POJOs, with easy access to all Java language features and the vast Java ecosystem. Thanks to Java's advanced concurrency API, Tapestry handles requests *fast* without sacrificing security or stability.

Scripting Ease

Tapestry features *live class reloading*: change your Java code, refresh the browser and see the changes... instantly! Have your cake and eat it too: the speed and depth of Java, the agile development style of Ruby or Python.

Highly Productive

Simple POJO classes, streamlined templates, live class reloading, state-of-the-art exception reporting, first-class Ajax support, and a big library of built-in components: Tapestry is designed from the ground up to give you great productivity.

We think you will love Tapestry! Give us 20 minutes and follow our quickstart guide.

Download Tapestry 5

Download the latest **Tapestry 5.3.2** release.

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From the community:

- Tynamo
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MORE MODULES

Tapestry 5 Demos

On-line demos available:

- Hotel Booking
- JumpStart

MORE DEMOS

Mentions
tapestry5

SaniyaBertina #tynamo releases tapestry-ckeditor and tapestry-editablecontent 0.0.1 for #tapestry5, see tynamo.org/tapestry-ckedi... and tynamo.org/tapestry-edita...
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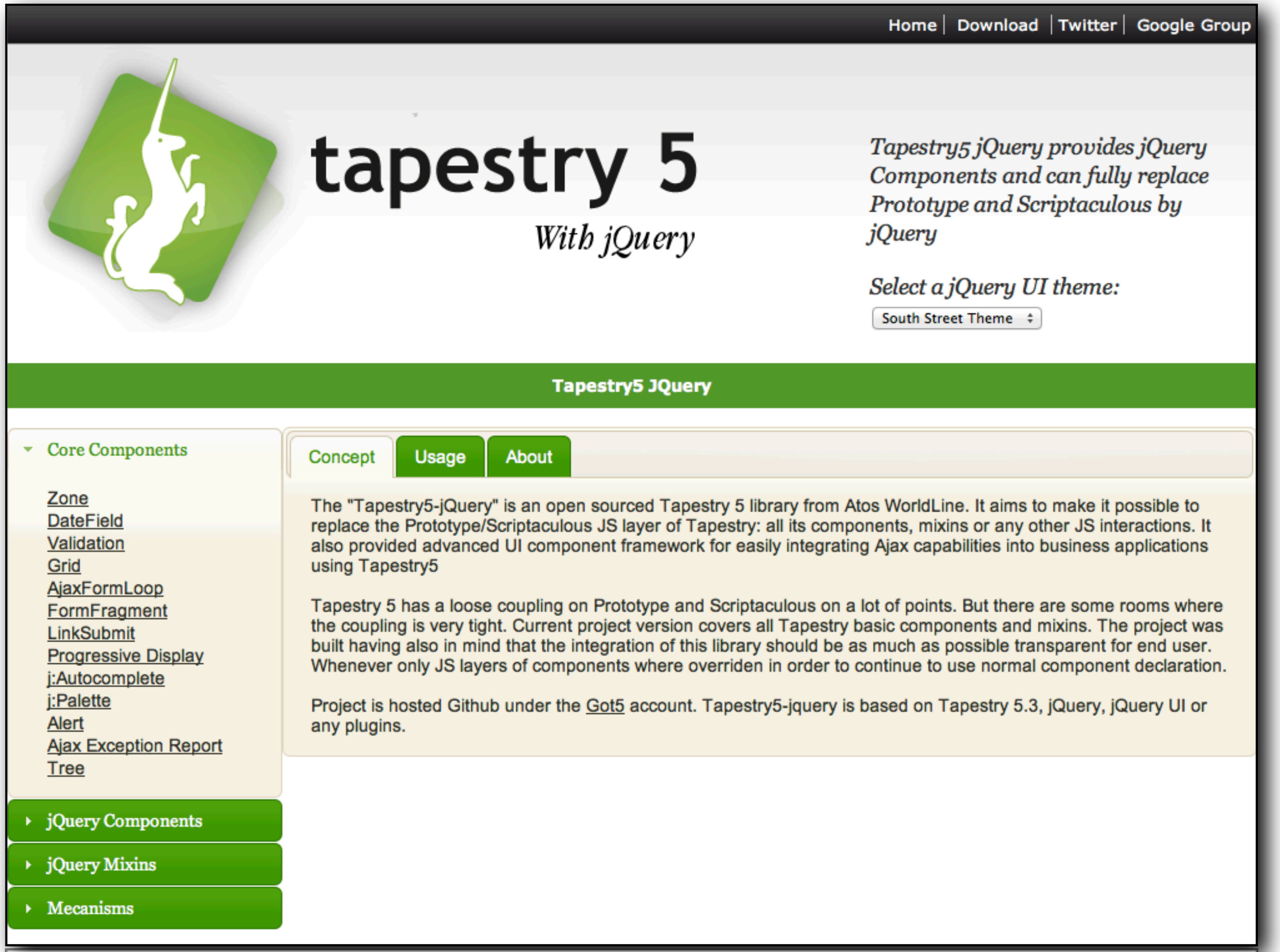
dragansah RT @tynamo_org: #tynamo releases tapestry-ckeditor and tapestry-editablecontent 0.0.1 for #tapestry5, see tynamo.org/tapestry-ckedi... and

http://tapestry.apache.org

More information on Tapestry



Tapestry5 jQuery provides jQuery Components and can fully replace Prototype and Scriptaculous by jQuery

Select a jQuery UI theme: South Street Theme

Tapestry5 JQuery

Core Components

- Zone
- DateField
- Validation
- Grid
- AjaxFormLoop
- FormFragment
- LinkSubmit
- Progressive Display
- j:Autocomplete
- j:Palette
- Alert
- Ajax Exception Report
- Tree

The "Tapestry5-jQuery" is an open sourced Tapestry 5 library from Atos WorldLine. It aims to replace the Prototype/Scriptaculous JS layer of Tapestry: all its components, mixins or any other JS interactions. It also provided advanced UI component framework for easily integrating Ajax capabilities into business applications using Tapestry5

Tapestry 5 has a loose coupling on Prototype and Scriptaculous on a lot of points. But there are some rooms where the coupling is very tight. Current project version covers all Tapestry basic components and mixins. The project was built having also in mind that the integration of this library should be as much as possible transparent for end user. Whenever only JS layers of components where overriden in order to continue to use normal component declaration.

Project is hosted Github under the Got5 account. Tapestry5-jquery is based on Tapestry 5.3, jQuery, jQuery UI or any plugins.

http://tapestry5-jquery.com/