SiteMesh – AOP for web pages

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Goals

- To provide an introduction to SiteMesh
- When to use it
- How to use it
- Exploration of advanced SiteMesh features
- Design patterns used by SiteMesh
- Extending SiteMesh

About the speaker

- Advisory Developer for delta.com
- 14 years experience
- B.Sc. (Hons) Computer Studies
- Sun Certified Programmer and Web Component Developer for the Java™ 2 platform
- SiteMesh contributor
- Opinions expressed do not necessarily reflect those of Delta Air Lines, Inc. or Delta Technology Inc.

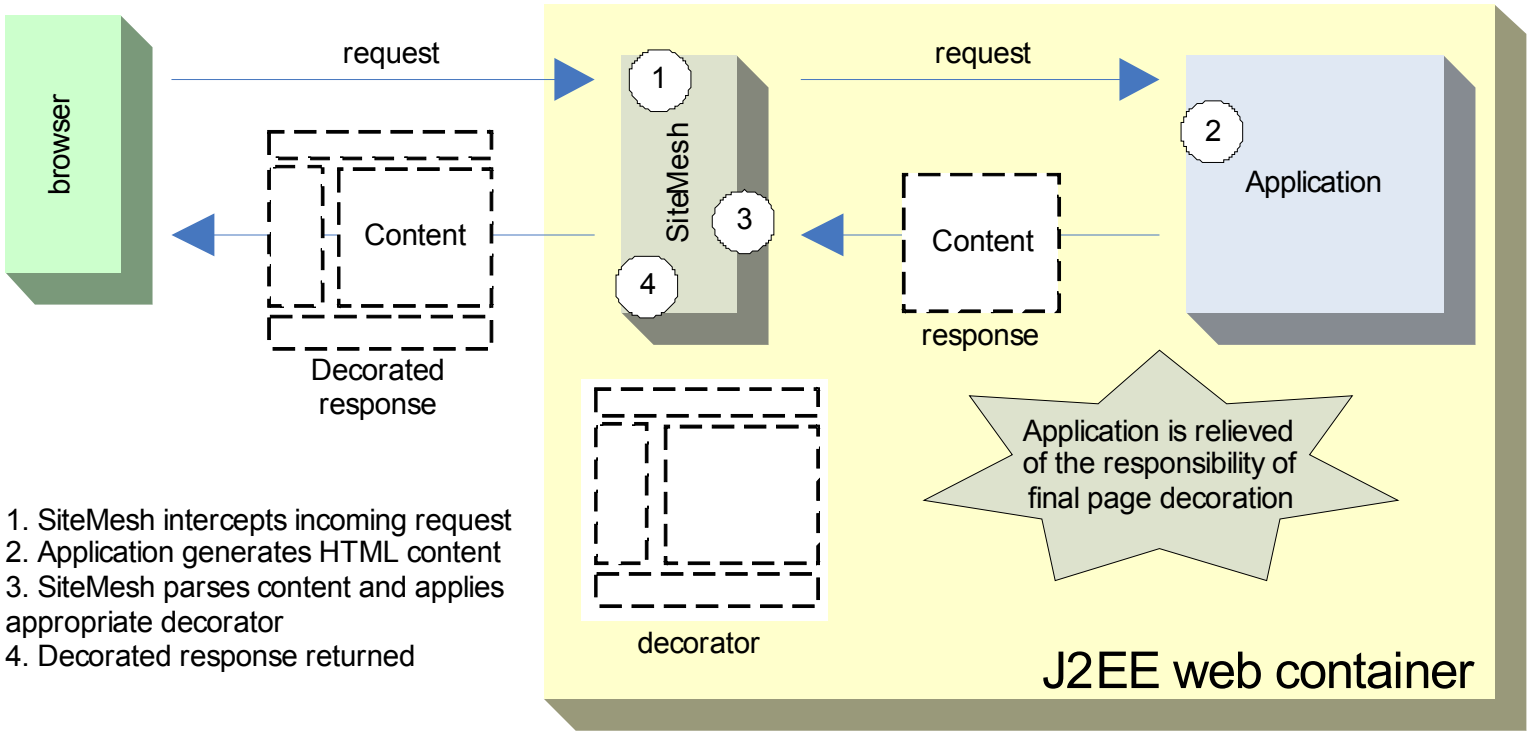
Problem background

- Web sites require consistent look and feel across all pages
- Template concept
- Common elements centralized in a template
- Dreamweaver/FrontPage templates ok for static pages
- What about dynamic transactional web-sites?

Requirements

- Need to provide a low-graphics version of the site for accessibility and for Pocket PC browsers
- Need to support multiple locales
- Need to provide bread-crumbs
- Need context-sensitive navigation menu
- Need to be compatible with existing Java web applications
- Need printable versions of each page
- In other words, the template to use has to be determined at request time based on properties of the request.
- SiteMesh can help

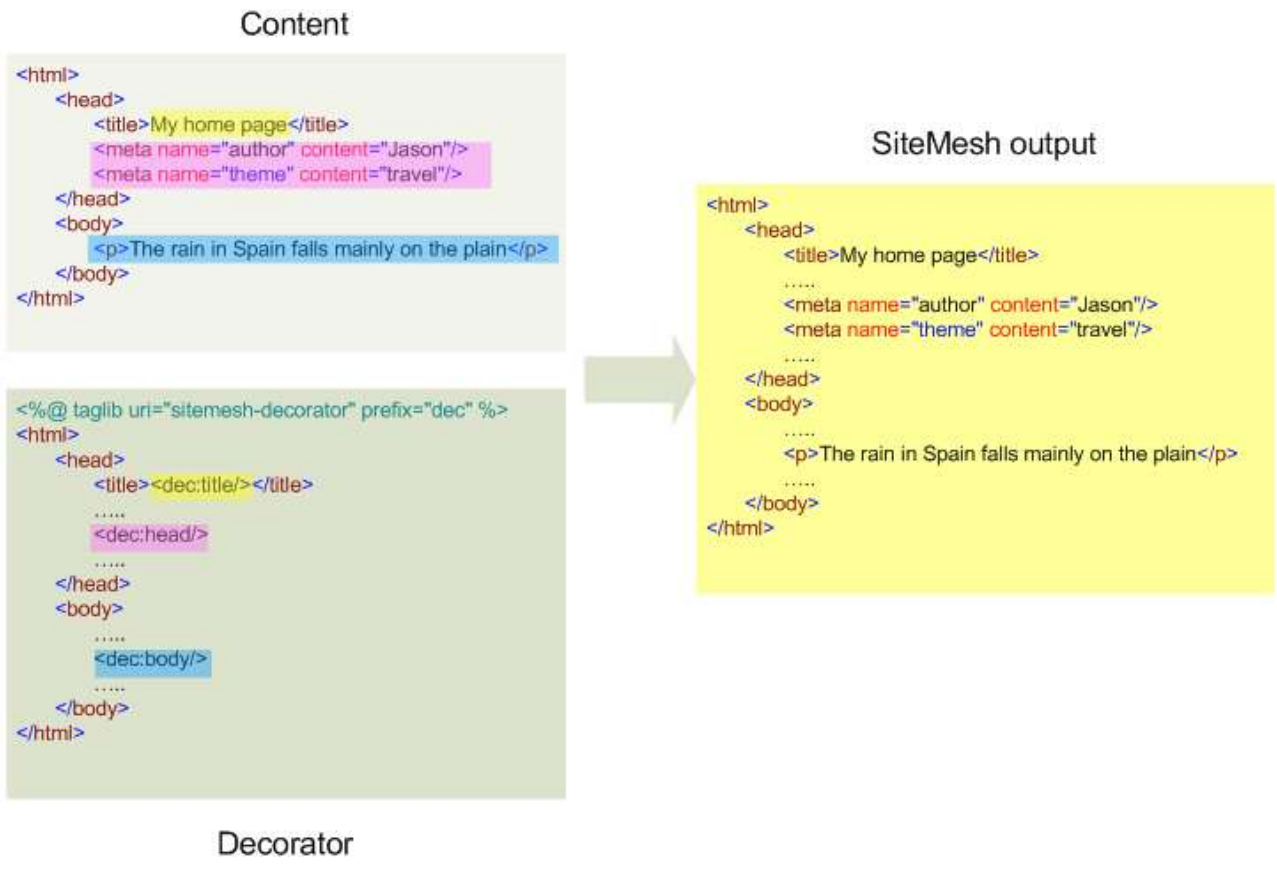
SiteMesh


browser
request
Content
Decorated
response
1
SiteMesh
3
4
request
2
Application
Content
response
Application is relieved
of the responsibility of
final page decoration
decorator
J2EE web container
1. SiteMesh intercepts incoming request
2. Application generates HTML content
3. SiteMesh parses content and applies
appropriate decorator
4. Decorated response returned

Decorators

- A decorator is a model for the response – a template or skin if you will
- Can be written in JSP, Velocity or Freemarker
- HTML with placeholders for head and body
- Application can have many decorators

Page decoration example



SiteMesh features

- Licensed using Apache style license
- Decorates text/html – doesn't care how it gets created!
- Easy to get started
- Non-invasive – implemented as a servlet filter making it easy to integrate with existing apps
- Decorator selection at request time – driven off properties of request (URL, cookie, language etc.)
- Decorators can be written in JSP, Velocity or FreeMarker
- Works with any Java Servlet technology based application (JSP, Struts, WebWork etc.)
- Extensible – custom decorator mappers

SiteMesh requirements

- Java Servlet 2.3 compatible web container
- JDK 1.4 recommended

SiteMesh installation

- Copy sitemesh.jar to WEB-INF/lib of web application
- Register SiteMesh filter in web.xml

```
<filter>
        <filter-name>sitemesh</filter-name>
        <filter-class>com.opensymphony.module.sitemesh.filter.PageFilter</filter-class>
</filter>
<filter-mapping>
        <filter-name>sitemesh</filter-name>
        <url-pattern>/*</url-pattern>
</filter-mapping>
```

SiteMesh installation – JSP special steps

- Copy SiteMesh tlds to WEB-INF/lib of web application
- Register SiteMesh taglibs in web.xml

```
<taglib>
        <taglib-uri>sitemesh-decorator</taglib-uri>
        <taglib-location>/WEB-INF/lib/sitemesh-decorator.tld</taglib-location>
</taglib>
<taglib>
        <taglib-uri>sitemesh-page</taglib-uri>
        <taglib-location>/WEB-INF/lib/sitemesh-page.tld</taglib-location>
</taglib>
```

Write decorator

- In your favorite template language – JSP, Velocity or Freemarker.
- Recommendation – put all decorators under WEB-INF/decorators
- Recommendation - Decorators should be broken down with common elements pulled out into separate components (DRY principle)
- Extra configuration steps for Velocity and Freemarker

```
<?xml version="1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" lang="en" xml:lang="en">
   <head>
      <title>$title</title>
      $head
   </head>

   <body>
      #include ("/WEB-INF/decorators/masthead.htm")
      #include ("/WEB-INF/decorators/menu.htm")
      $body
      #include ("/WEB-INF/decorators/footer.htm")
   </body>
</html>
```

```
<%@ taglib uri="sitemesh-decorator" prefix="dec" %>
<?xml version="1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
   "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">

<html xmlns="http://www.w3.org/1999/xhtml" lang="en" xml:lang="en">
   <head>
      <title><dec:title/></title>
      <dec:head/>
   </head>

   <body>
      <%@ include file="/WEB-INF/decorators/masthead.htm" %>
      <%@ include file="/WEB-INF/decorators/menu.htm" %>
      <dec:body/>
      <%@ include file="/WEB-INF/decorators/footer.htm" %>
   </body>
</html>
```

When to use your decorator

- Need to declare your decorator to SiteMesh
- Map decorator to a URL pattern
- /WEB-INF/decorators.xml
- Tells SiteMesh to use mydecorator for all webpages:

```
<decorators>
  <decorator name="mydecorator"
   page="/WEB-INF/decorators/mydecorator.vm">
    <pattern>/*</pattern>
  </decorator>
</decorators>
```

Demo time

Now what...

- This should be enough to get you going
- Following part of presentation dives deeper into advanced SiteMesh features and
- Design patterns used
- SiteMesh extensions

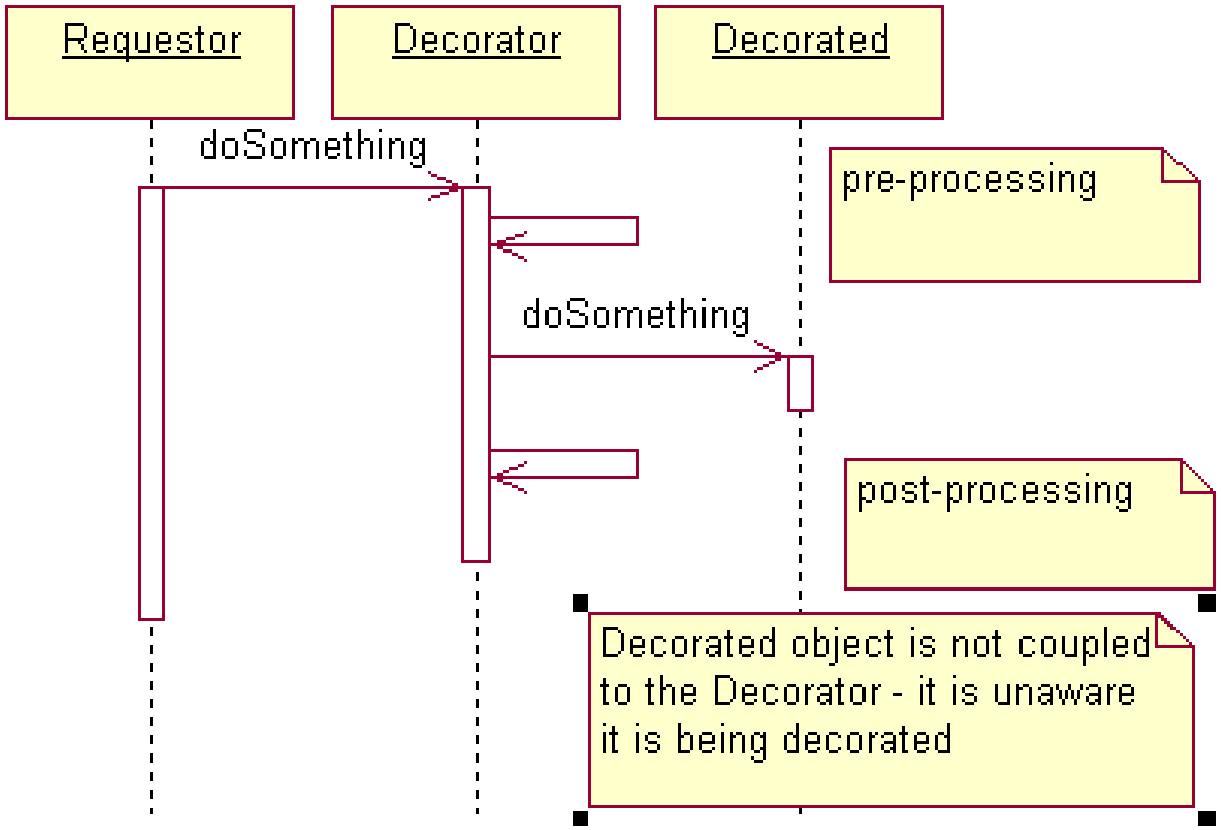
What is a servlet filter?

- Introduced in 2.3 of Servlet specification
- Intercept invocation of a servlet before it is called
- Can modify request headers/data (pre-process)
- Pass control to the next in chain (or the servlet if no more filters)
- Filter regains control – can modify response (pos-process: hint this is where the decoration occurs)
- Typical applications – security, logging, decorating etc.

Decorator design pattern

- Attaches responsibilities to objects at runtime. Decorators provide a flexible alternative to subclassing.
- Also known as Wrapper
- Decorator object masquerades as the decorated (e.g. implements same interface)
- Intercepts request and does something before and/or after forwarding the request to the decorated
- Decorated object has no knowledge it has been decorated

Decorator design pattern



Decorator design pattern?

```
FileReader frdr = new FileReader(filename);
LineNumberReader lrdr = new LineNumberReader(frdr);
```

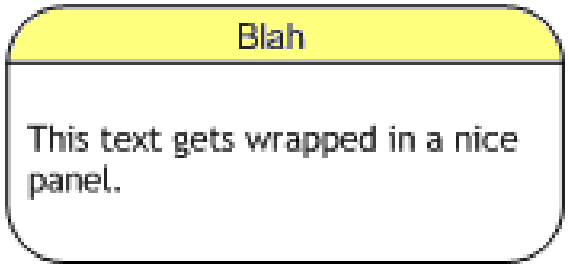
- lrdr is the decorator
- frdr is the decorated
- See http://www.javaworld.com/javaworld/jw-12-2001/jw-1214-designpatterns.html - a great article about the Decorator pattern by David Geary

Inline decoration

- In-line decorators – similar to page decorators
- Generates HTML fragment vs. HTML document
- Good for panels
- Warning! – increases coupling of app to SiteMesh (if in-line decoration is used in application JSPs)

Inline decoration

```
<%@ taglib uri="sitemesh-page" prefix="page" %>
..
<page:applyDecorator name="panel">
 <page:param name="title">Blah</page:param>
This text gets wrapped in a nice panel.
</page:applyDecorator>
..
```



About the Page object

- SiteMesh parse of the content produces a Page object
- In addition to <head> <title> and <body>, <meta> tags and <body> attributes from the original content are made available in the Page object
- Page object is accessible in the decorator

Page object: advanced use

- Meta tags mechanism can be used to provide hints to the decoration process
- In the content:
  ```
  <meta name="author" content="Jason"/>
  ```
- Access in the decorator:
  ```
  $page.getProperty("meta.author")

  <decorator:getProperty
  property="meta.author"/>
  ```

Tag library for decorators

<decorator:head>

Insert contents of original page's HTML <head> tag

<decorator:body>

Insert contents of original page's HTML <body> tag

<decorator:title>

Insert title of original page

<decorator:getProperty>

Insert property of original page e.g. meta tags

<decorator:usePage>

Expose the Page object as a variable

Tag library for content pages

- Primarily used for in-line decoration of HTML fragments in content pages
- May also be used in decorators (composite decoration – a'la Tiles)

<page:applyDecorator />

Apply a Decorator to specified content.

<page:param />

Nested in the applyDecorator tag, used to pass parameters to the decorator.

Mapping decorators

- SiteMesh determines which decorator to use based on properties of the request
- DecoratorMapper objects organized in a chain perform this function
- Chain is defined in sitemesh.xml
- Chain of Responsibility pattern

Chain of Responsibility

- Avoid coupling the sender of a request to its receiver by giving more than one object a chance to handle the request
- 1st object in chain looks at the request
- .. either handles it or passes it along (successor)
- Sender doesn't know/care which object in the chain handles the request

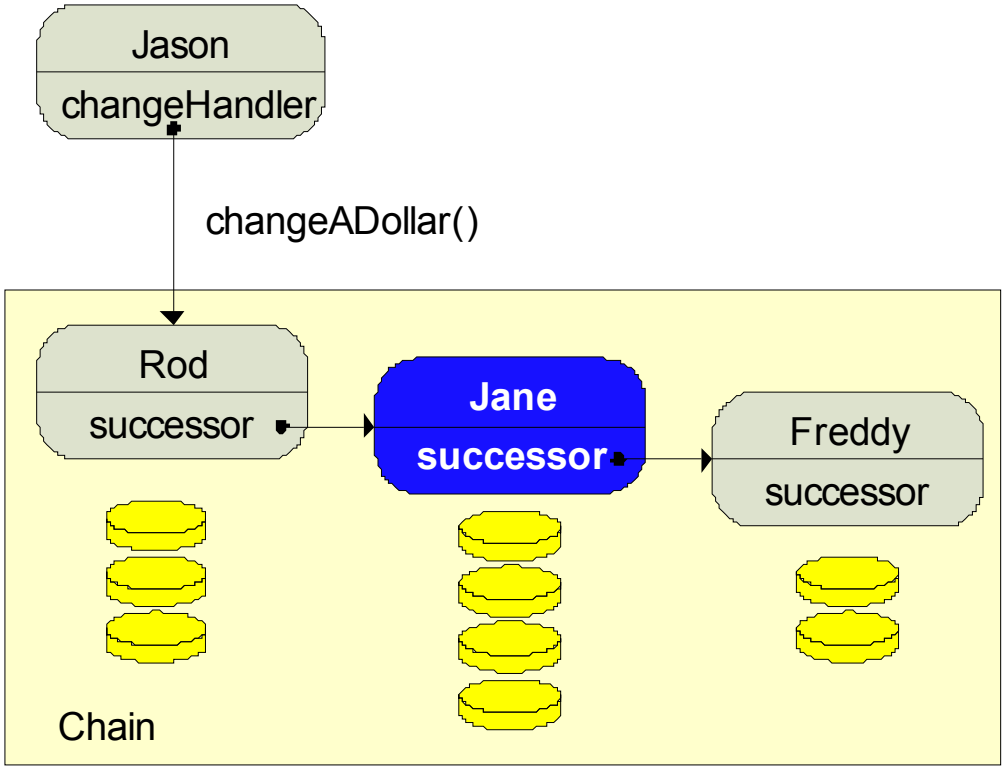
Chain of Responsibility (cont'd)

- Objects in the chain are loosely coupled to each other
- Chain can be constructed dynamically
- More than one object in the chain may handle the request
- Request may fall off the end of the chain
- See http://www.javaworld.com/javaworld/jw-08-2003/jw-0829-designpatterns.html another great article by David Geary

Chain of Responsibility

- Demo time!!
- Need three volunteers!

In case the demo didn't work



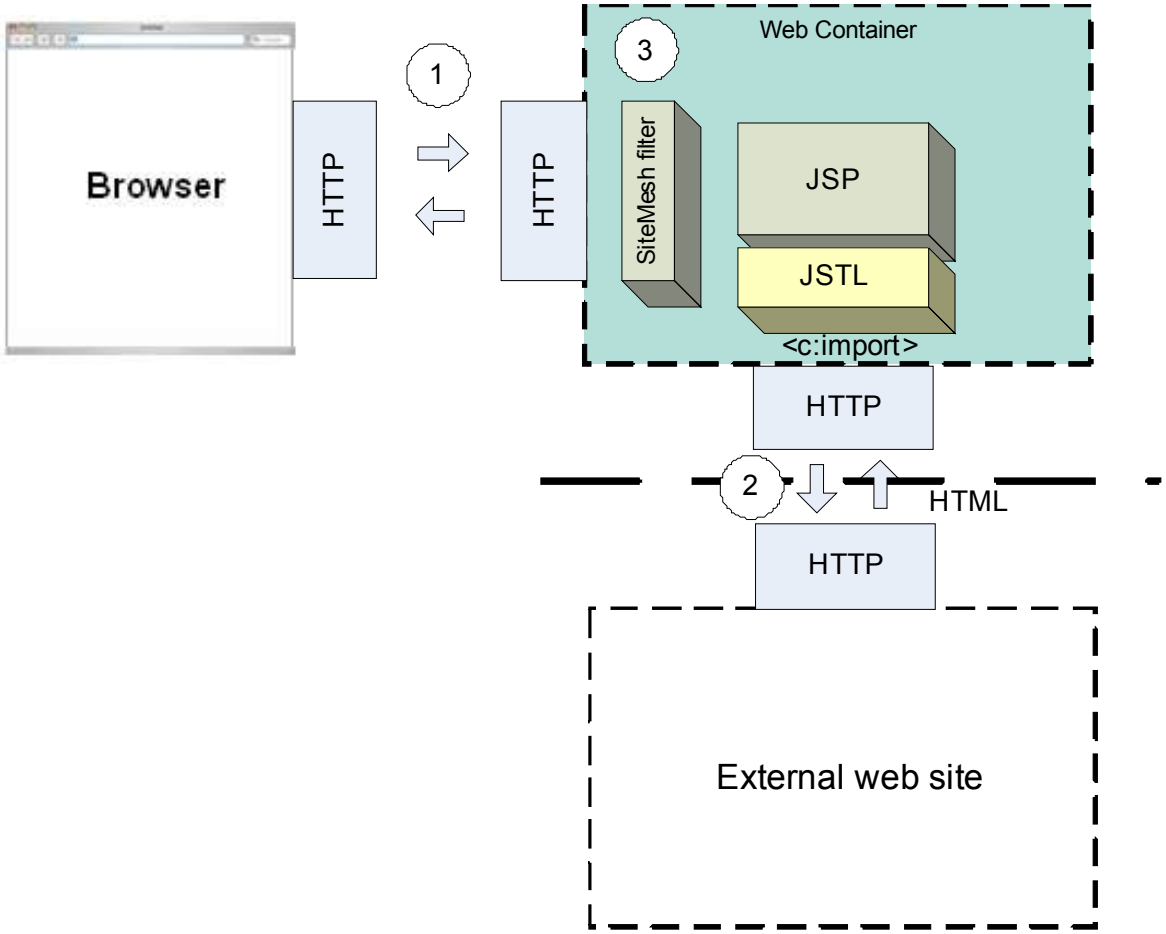
DecoratorMappers examples

- AgentDecoratorMapper – User-Agent
- OSDecoratorMapper – UA-OS
- LanguageDecoratorMapper - Accept-Language
- RobotDecoratorMapper – bare bones decoration

Extensions

- Needed country recognition (in addition to Language)
- Needed to drive decoration based off cookies (e.g. logged off vs logged in)
- I wrote two new DecoratorMappers to meet these needs
- http://jira.opensymphony.com/browse/SIM-159
- http://jira.opensymphony.com/browse/SIM-166

How to decorate an external page



How to decorate PHP? .NET?

- And other non-Java generated HTML content?
- See previous slide!!

Issues and workarounds

- Caching of Velocity templates doesn't work - known issue with the Velocity-tools 1.1 (not with SiteMesh).
- Decoration of .html – many app servers by-pass servlet-container (and therefore SiteMesh) when serving .html
- In-line decorators written in Velocity where the content page is JSP.
- Recommend writing decorators in JSP if you’re content pages/app views are JSPs

Resources

- http://www.opensymphony.com/sitemesh
- http://wiki.opensymphony.com/display/SM/Index
- https://sitemesh.dev.java.net/
- http://today.java.net/pub/a/today/2004/03/11/sitemesh.htm
- http://www.onjava.com/pub/a/onjava/2004/09/22/sitemesh
- http://www.reumann.net/struts/lessons/sitemesh/rr_siteme
- http://jroller.com/page/dgeary/20041216
- http://wiki.opensymphony.com/download/attachments/144