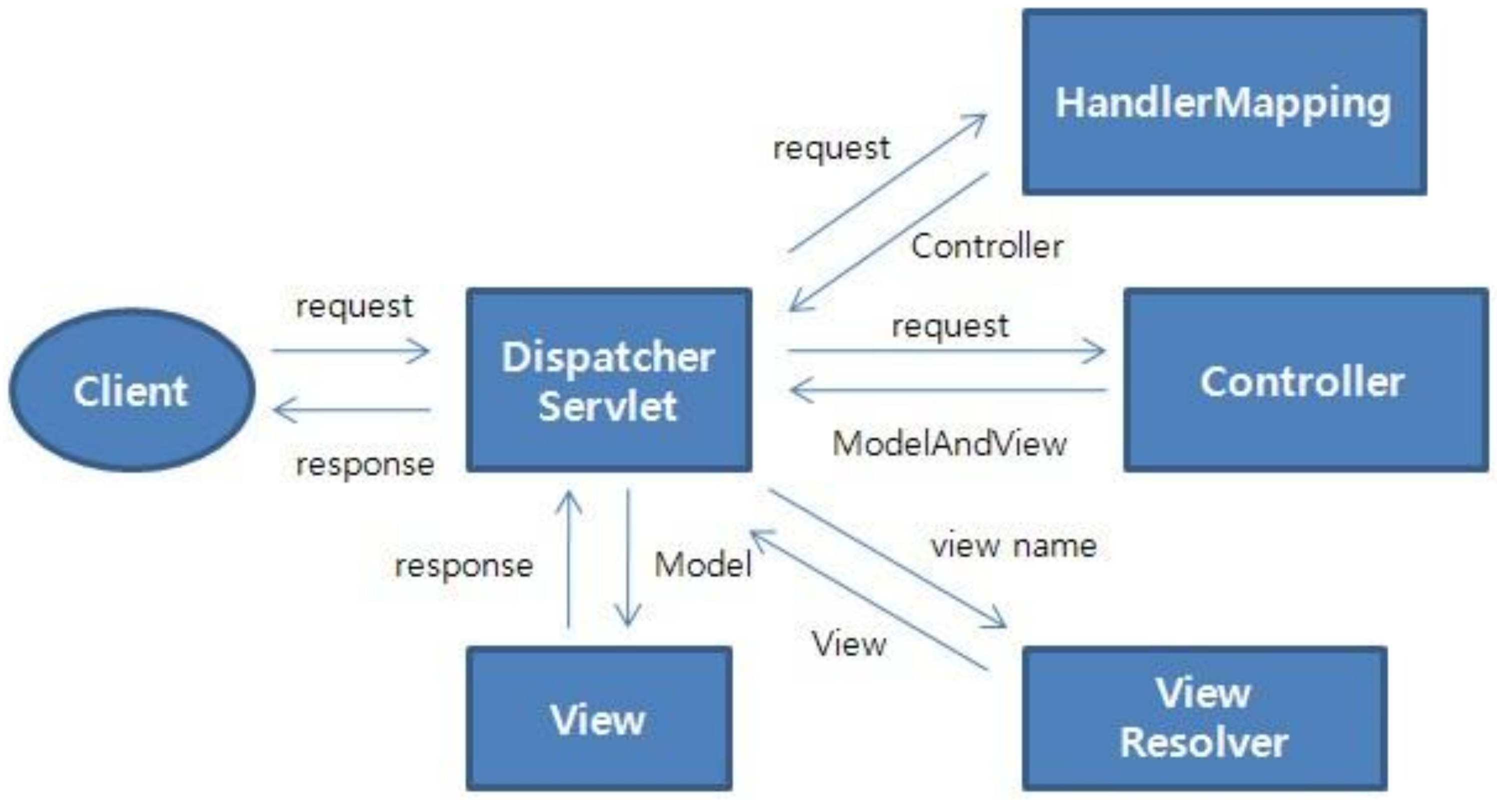
Resolvers & Upload & Exceptions & Internationalization & Tiles

Harmonizing Diversity

Spring MVC Flow



Spring MVC View Resolvers

- Flexible View Resolving Mechanism
- Resolve logical String-based view names to View types.
- Many out-of-the-box implementations[examples]:

1. **UrlBasedViewResolver-**This directly resolves a view name to a URL without any explicit mapping. The view names can be the URL themselves or a prefix or suffix can be added to get the URL from the view name.
2. **InternalResourceViewResolver-**This is a subclass of

   UrlBasedViewResolver. Out-of-the-box support for JSP
3. **FreeMarkerViewResolver-**This is a subclass of **UrlBasedViewResolver** that supports FreeMarkerView and its subclasses.
4. **VelocityViewResolver-**This is a subclass of **UrlBasedViewResolver** that supports VelocityView and its subclasses.
5. **ContentNegotiatingViewResolver-**This is an implementation of a view resolver based on the request file name or Accept header – mime-type. This class delegates view resolution to other view resolvers that are configured.

Multiple View Resolvers Configuration

- <!-- lower order value has a higher priority -->

```
<bean class="org.springframework.web.servlet.view.InternalResourceViewResolver">
<property name="prefix" value="/WEB-INF/views/" />
<property name="order" value="4" />
</bean>

<bean class="org.thymeleaf.spring4.view.ThymeleafViewResolver">
<property name="templateEngine" ref="templateEngine" />
<property name="viewNames" value="*.html" />
<property name="order" value="3" />
</bean>

<bean id="viewResolver"
class="org.springframework.web.servlet.view.freemarker.FreeMarkerViewResolver">
<property name="cache" value="true" />
<property name="prefix" value="" />
<property name="suffix" value=".ftl" />
<property name="order" value="2" />
</bean>
```

Spring MVC Views

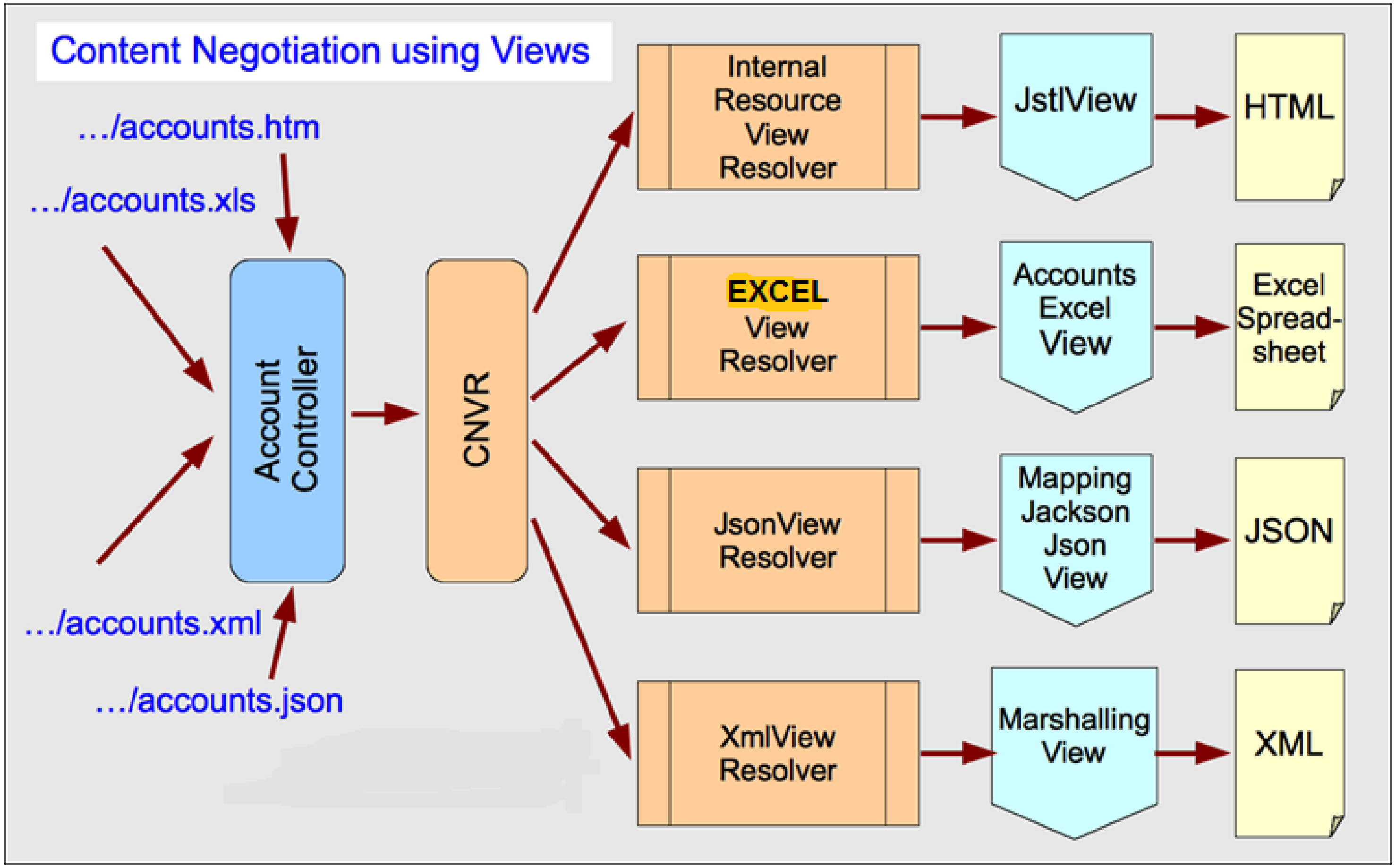
- Spring has flexible view support through the View Interface class
- Out-of-the-box view support for:

JspView	- InternalResourceViewResolver	
JSON	- ContentNegotiatingViewResolver	**
XML	- ContentNegotiatingViewResolver	**
PDF	- ContentNegotiatingViewResolver	**
Excel	- ContentNegotiatingViewResolver	**
Tiles	- TilesViewResolver	
Velocity	- VelocityViewResolver	
FreeMarker	- FreeMarkerViewResolver	
Redirect	- InternalResourceViewResolver	
Forward	- InternalResourceViewResolver	

** "Candidates"

ContentNegotiatingViewResolver

- Scenario based on “file extension” in URL:



- Single Controller method..multiple views…CNVR

ContentNegotiatingViewResolver

- Resolve a view based on the file extension or Accept header of the HTTP request.

GET /api/something?param1=value1

Accept: application/xml (or application/json)

- Does not perform the view resolution itself but instead delegates to a list of view resolvers that you specify through the bean property ViewResolvers.

ContentNegotiatingViewResolver

```
<bean class=
   "org.springframework.web.servlet.view.ContentNegotiatingViewResolver"
   >
   <property name="defaultViews">
      <list>
         <ref bean="jsonView"/>
         <ref bean="xmlView"/>
      </list>
   </property>
</bean>

<bean id="jsonView"class=
   "org.springframework.web.servlet.view.json.MappingJacksonJsonView">
   <property name="prettyPrint" value="true"/>
</bean>
```

ContentNegotiatingViewResolver

```
@Bean
public MappingJackson2JsonView jsonView() {
    MappingJackson2JsonView jsonView = new MappingJackson2JsonView();
    jsonView.setPrettyPrint(true);
    return jsonView;
}
@Bean
public MarshallingView xmlView() {
    Jaxb2Marshaller marshaller = new Jaxb2Marshaller();
    marshaller.setClassesToBeBound(Product.class);
    MarshallingView xmlView = new MarshallingView(marshaller);
    return xmlView;
}
@Bean
public ViewResolver contentNegotiatingViewResolver(ContentNegotiationManager manager) {
    ContentNegotiatingViewResolver resolver = new ContentNegotiatingViewResolver();
    resolver.setContentNegotiationManager(manager);
    List<View> views = new ArrayList<>();
    views.add(jsonView());
    views.add(xmlView());
    resolver.setDefaultViews(views);
    return resolver;
}
```

Resolving Image files for uploading

- HTTP multipart request is used by browsers to upload files/data to the server.
- Spring good support HTTP multipart request:
  - CommonsMultipartResolver
- DispatcherServlet XML/Java config:

```
<bean id="multipartResolver"
  class="org.springframework.web.multipart.commons.CommonsMulti
  partResolver">
  <property name="maxUploadSize" value="10240000"/>
</bean>
```

```
@Bean
public CommonsMultipartResolver multipartResolver() {
  CommonsMultipartResolver resolver = new CommonsMultipartResolver();
  resolver.setDefaultEncoding("utf-8");
  resolver.setMaxUploadSize(10240000);
  return resolver;
}
```

Resolving Image files for uploading[Cont.]

- JSP configuration

```
<form:form modelAttribute="newProduct" class="form-horizontal"
   enctype="multipart/form-data">
   <div class="form-group">
      <label class="control-label col-lg-2" for="productImage">
        <spring:message code="addProduct.form.productImage.label"
          />
      </label>
      <div class="col-lg-10">
        <form:input path="productImage" id="productImage"
        type="file" class="form:input-large" />
      </div>
   </div>
</form:form>
```

Content-Type: multipart/form-data

Resolving Image files for uploading [Cont.]

```
@XmlRootElement
public class Product implements Serializable {

  @Pattern(regexp = "P[1-9]+", message =
    "{Pattern.Product.productId.validation}")
  @ProductId
  private String productId;

  @Size(min = 4, max = 50, message =
    "{Size.Product.name.validation}")
  private String name;

  @JsonIgnore
  private MultipartFile productImage;
}
```

Resolving Image files for uploading[Cont.]

- Saving image in Controller:

```
@RequestMapping(method = RequestMethod.POST)
public String processAddNewProductForm(@Valid @ModelAttribute("newProduct") Product newProduct,
BindingResult result, Model model, HttpServletRequest request) {

   MultipartFile productImage = newProduct.getProductImage();
   String rootDirectory = request.getSession().getServletContext().getRealPath("/");
   if (productImage != null && !productImage.isEmpty()) {
      try {
         productImage.transferTo(
         new File(rootDirectory + "resources\\images\\" + newProduct.getProductId() +
            ".png"));
      } catch (Exception e) {
         throw new RuntimeException("Product Image saving failed", e);
      }
   }

   productService.addProduct(newProduct);
   return "redirect:/products";
}
```

Main Point

- Spring MVC Views and View Resolvers offers a variety of ways to manage the presentation of data.
- *Life is the expression of the field of all possibilities resulting in a veritable explosion of variety in nature*

Handler Exception Resolver

- `HandlerExceptionResolver` interface
  - Used to resolve exceptions during Controller mapping & execution
  - Two Default implementations [“out of the box”]:
    - `ResponseStatusExceptionResolver` – supports `@ResponseStatus`
    - `ExceptionHandlerExceptionResolver` – supports `@ExceptionHandler`

- Exceptions can be handled EITHER individually OR Globally across ALL Controllers with `@ControllerAdvice` “interceptor”

ResponseStatusExceptionResolver

- Marks a method or exception class with the status code and reason that should be returned. "Customizes" exceptions as HTTP status codes
- The status code is applied to the HTTP response when the handler method is invoked, or whenever said exception is thrown
- Could reside on Exception OR in @ControllerAdvice

ResponseStatusExceptionResolver (cont.)

- Customized Exception:

```
@ResponseStatus(value = HttpStatus.NOT_FOUND, reason = "No products found under this
    category.")
public class NoProductsFoundUnderCategoryException extends RuntimeException {

    private String message;

    public NoProductsFoundUnderCategoryException(String message) {
        this.message = message;
    }
}
```

- ProductController.java

```
@RequestMapping("/products/{category}")
public String getProductsByCategory(Model model, @PathVariable String category) {
    List<Product> products = productService.getProductsByCategory(category);
    if (products == null || products.isEmpty()) {
    throw new NoProductsFoundUnderCategoryException();
    }
    model.addAttribute("products", products);
    return "products";
}
```

ExceptionHandlerExceptionResolver

- Method identified as `@ExceptionHandler` for exception resolution
- Could reside in EITHER `ProductController` OR `@ControllerAdvice`

```
@ExceptionHandler(NoProductsFoundUnderCategoryException.class)
public ModelAndView handleError(HttpServletRequest req,
    NoProductsFoundUnderCategoryException exception) {
     ModelAndView mav = new ModelAndView();
     mav.addObject("msg", exception.getMessage());
     mav.addObject("exception", exception);
     mav.addObject("url", req.getRequestURL());
     mav.setViewName("noProductFound");
     return mav;
}
```

- Exception JSP: `noProductFound.jsp`

```
<div class="jumbotron">
   <div class="container">
      <h1 class="alert alert-danger">${msg}</h1>
   </div>
</div>
```

@ControllerAdvice

- Indicates the annotated class assists a "Controller"
- Works across ALL controllers
- It is typically used to define `@ExceptionHandler`, `@InitBinder`, and `@ModelAttribute` methods that apply to all `@RequestMapping` methods.

- Handle all `ProductNotFoundException` throws in any class:

```
@ControllerAdvice
public class ControllerExceptionHandler {

    @ExceptionHandler(ProductNotFoundException.class)
    public ModelAndView handleError(HttpServletRequest req,
      ProductNotFoundException exception) {
       ModelAndView mav = new ModelAndView();
       mav.addObject("invalidProductId", exception.getProductId());
       mav.addObject("exception", exception);
       mav.addObject("url", req.getRequestURL() + "?" +
          req.getQueryString());
       mav.setViewName("productNotFound");
       return mav;
    }
}
```

Internationalization

- Internationalization
  - (a.k.a. Globalization, a.k.a. Enabling)Designing and developing a software product to function in multiple locales. This process involves identifying the locales that must be supported, designing features which support those locales, and writing code that functions equally well in any of the supported locales.
- Localization
  - Modifying or adapting a software product to fit the requirements of a particular locale. This process includes (but may not be limited to) translating the user interface, documentation and packaging, changing dialog box geometries, customizing features (if necessary), and testing the translated product to ensure that it still works (at least as well as the original).

Internationalization

- i18n – ‘i’+ 18 chars + ‘n’ == internationalization
- Support for multiple languages & data format with code rewrite
- Examples:

zh	Chinese	nl	Dutch
hi	Hindi	el	Greek
ja	Japanese	fr	French

- L10n = ‘l’+10 chars + ‘n’ = localization
- Support locale-specific [geographic/region/country] information

Egypt	EG	Libya	LY	China	CN
India	IN	Taiwan	TW		
Mynmar	MM	Mongolia	MN		

Java Locale class

- Locale(String language)
- Locale(String language, String Country)
- Locale(String language, String Country, String variant)

- Variant is browser specific code [windows, MAC, etc.]

- Message are stored in ".properties files indicating Locale
- E.g. messages_zh.properties
- Optionally messages_zh_CN.properties

Locale Resolvers

- Browser's Accept-Language header

```
<bean id="localeResolver" class="org.springframework.web.servlet.i18n.AcceptHeaderLocaleResolver">
  <property name="defaultLocale" value="en_US"/>
</bean>
```

- Session
  - uses a locale attribute in the user's session

```
<bean id="localeResolver"
  class="org.springframework.web.servlet.i18n.SessionLocaleResolver">
  <property name="defaultLocale" value="en_US"/>
</bean>

@Bean
public LocaleResolver localeResolver() {
    SessionLocaleResolver resolver = new SessionLocaleResolver();
    resolver.setDefaultLocale(new Locale("en"));
    return resolver;
}
```

- Cookie
  - uses a cookie sent back to the user

```
<bean id="localeResolver"
  class="org.springframework.web.servlet.i18n.CookieLocaleResolver">
  <property name="defaultLocale" value="en_US"/>
</bean>
```

LocaleChangeInterceptor

- Used to handle Cookie or Session locale resolvers AUTOMATICALLY

```
<mvc:interceptors>
    <bean class=
        "org.springframework.web.servlet.i18n.LocaleChangeIntercept
or">
        <property name="paramName" value="language"/>
    </bean>
</mvc:interceptors>
```

This is the parameter that the interceptor looks for...

```
@Override
public void addInterceptors(InterceptorRegistry registry) {
  LocaleChangeInterceptor localeChangeInteceptor = new
    LocaleChangeInterceptor();
  localeChangeInteceptor.setParamName("language");
  registry.addInterceptor(localeChangeInteceptor);
}
```

Tiles

- Apache Tiles is a free, open source templating framework purely built on the Composite design pattern.

- Composite View Pattern
  - create pages using a consistent structure
  - pages share the same layout
  - individual pages differ in segments
  - segment placement maintains positional consistency across all the site.

- In Tiles, a page is built by assembling a composition of sub views called Tiles.

Tiles Configuration

```
<bean id="tilesViewResolver"
    class="org.springframework.web.servlet.view.UrlBasedViewResolver">
  <property name="viewClass"
      value="org.springframework.web.servlet.view.tiles3.TilesView" />
  <property name="order" value="-2" />
</bean>

 <bean id="tilesConfigurer"
class="org.springframework.web.servlet.view.tiles3.TilesConfigurer">
       <property name="definitions">
           <list>
            <value>
              /WEB-INF/tiles/definitions/tile-definition.xml
            </value>
           </list>
       </property>
</bean>
```

Tiles Configuration(Java Config)

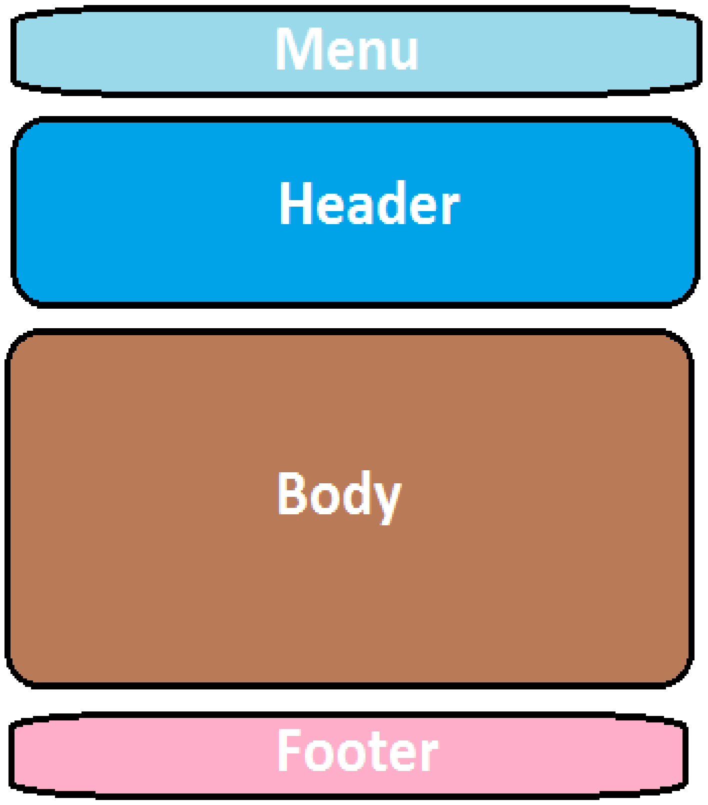
```
@Configuration
@EnableWebMvc
@ComponentScan("edu.mum.cs")
public class WebApplicationContextConfig extends WebMvcConfigurerAdapter {

   @Bean
   public TilesConfigurer tilesConfigurer() {
      TilesConfigurer tilesConfigurer = new TilesConfigurer();
      tilesConfigurer.setDefinitions(new String[] { "/WEB-INF/views/**/tiles.xml"
        });
      tilesConfigurer.setCheckRefresh(true);
      return tilesConfigurer;
   }

   @Override
   public void configureViewResolvers(ViewResolverRegistry registry) {
      TilesViewResolver viewResolver = new TilesViewResolver();
      registry.viewResolver(viewResolver);
   }

}
```

Sample Template [layoutTemplate.jsp]



```
<title><tiles:insertAttribute name="title" />
<body>
   <ul class="nav nav-pills pull-right">
    <tiles:insertAttribute name="menu" />
   </ul>
   <h3 class="text-muted">Web Store</h3>

   <h1>
    <tiles:insertAttribute name="header" />
   </h1>
   <p>
      <tiles:insertAttribute name="subHeader" />
   </p>

   <div class="row">
     <tiles:insertAttribute name="body" />
   </div>

   <div class="footer">
    <tiles:insertAttribute name="footer" />
   </div>
</body>
```

Example Tiles Definition File [tiles.xml]

```xml
<tiles-definitions>

   <!-- Template Definition -->
   <definition name="template-def"
       template="/WEB-INF/views/tiles/layouts/defaultLayout.jsp">
       <put-attribute name="title" value="" />
       <put-attribute name="header" value="/WEB-INF/views/tiles/templates/header.jsp" />
       <put-attribute name="menu" value="/WEB-INF/views/tiles/templates/menu.jsp" />
       <put-attribute name="body" value="" />
       <put-attribute name="footer" value="/WEB-INF/views/tiles/templates/footer.jsp" />
   </definition>

</tiles-definitions>
```

Example Tiles Pages [tiles.xml]

```
<!-- Main Page -->
  <definition name="myhome" extends="template-def">
      <put-attribute name="title" value="Welcome" />
      <put-attribute name="body" value="/WEB-INF/views/pages/home.jsp" />
  </definition>

  <!-- User Page -->
  <definition name="user" extends="template-def">
      <put-attribute name="title" value="User" />
      <put-attribute name="body" value="/WEB-INF/views/pages/user.jsp" />
  </definition>

  <!-- Admin Page -->
  <definition name="admin" extends="template-def">
      <put-attribute name="title" value="Admin" />
      <put-attribute name="body" value="/WEB-INF/views/pages/admin.jsp" />
  </definition>
```

Tiles: Wildcard

```
<bean id="tilesConfigurer"
    class="org.springframework.web.servlet.view.tiles3.TilesConfigurer">
   <property name="definitions">
      <list><value>/WEB-INF/views/**/tiles.xml</value></list>
   </property>
   <property name="completeAutoload" value="true" />
</bean>
```

```
tiles.xml
<definition name="WILDCARD:user/*" extends="template-def">
       <put-attribute name="title" value="{1}" />
       <put-attribute name="body" value="/WEB-INF/views/pages/{1}.jsp" />
</definition>
```

Main Point

- A well-defined exception and error handling approach is important for simplifying the development of web applications.
- *The removal of obstacles is an important aspect of the process of evolution.*