Developer Guide

Developing applications using RichFaces 4 *(draft)*

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Introduction

The RichFaces framework is a rich component library for JavaServer Faces (JSF). It allows integration of Ajax capabilities into enterprise web application development without needing to use JavaScript.

RichFaces leverages several parts of the JSF2 framework including lifecycle, validation, conversion facilities, and management of static and dynamic resources. The RichFaces framework includes components with built-in Ajax support and a customizable look-and-feel that can be incorporated into JSF applications.

RichFaces provides a number of advantages for enterprise web application development:

- Build on the benefits of JavaServer Faces with support for Ajax. RichFaces is fully integrated into the JSF lifecycle: it uses the action and value change listeners, and invokes server-side validators and converters during the Ajax request-response cycle.
- Extend Ajax capability in existing JSF applications. The core Ajax library (`a4j`) adds extra Ajax functionality into existing pages, such that additional JavaScript code is unnecessary and existing components do not need to be replaced with Ajax ones. RichFaces enables page-wide Ajax support instead of the traditional component-wide support, and events can be defined on the page for invoking an Ajax requests and JSF Component Tree synchronization.
- Create complex application views using out-of-the-box components. The RichFaces user interface (UI) library (`rich`) contains components for adding rich interactive features to JSF applications. It extends the RichFaces framework to include a large set of Ajax-enabled components that come with extensive skinning support. Additionally, the RichFaces framework is designed to be used seamlessly with other 3d-party libraries on the same page, so you have more options for developing applications.
- Write your own customized rich components with built-in Ajax support. The Component Development Kit (CDK), used for the RichFaces UI library creation, includes a code-generation facility and a templating facility using XHTML (extended hyper-text markup language) syntax.
- Package dynamic resources with application Java classes. Ajax functionality in RichFaces extends support for the management of different resources, such as pictures, JavaScript code, and CSS stylesheets. The resource framework makes it possible to pack dynamic resources along with the code for any custom components.
- Generate binary resources on the fly. The resource framework can generate images, sounds, **Microsoft Excel** spreadsheets, and more during run-time.
- Create a modern rich user-interface with skinning technology. RichFaces provides a skinning feature that allows you to define and manage different color schemes and other parameters of the look and feel. It is possible to access the skin parameters from JSP code and Java code during run-time. RichFaces comes packaged with a number of skins to get you started, but you can also easily create your own customized skins too.

Getting started with RichFaces

Follow the instructions in this chapter to configure the RichFaces framework and get started with application development. RichFaces applications can be developed using JBoss Tools, as described in *Section 2.3, “Creating a project with JBoss Tools”*; or using Maven, as described in *Section 2.4, “Creating a project with Maven”*.

If you have existing projects that use a previous version of RichFaces, refer to the *RichFaces Migration Guide*.

2.1. Technical Requirements

The minimum technical requirements needed to get started with RichFaces are outlined below.

- Java Development Kit (JDK) 1.5 or higher
- JBoss Tools 3.1
- A JavaServer Faces 2 (JSF 2) implementation
- An application server, such as JBoss Application Server 6 or Apache Tomcat 6.
- A web browser, such as Firefox 3.5 or Internet Explorer 7

RichFaces supports additional products not listed here. Refer to *Section 3.1, “Full technical requirements”* for a full list of technical requirements and supported envrionments, browsers, and tools.

2.2. Setting up RichFaces

Follow the instructions in this section to set up the RichFaces framework and begin building applications.

1. **Download RichFaces archive**

   Download RichFaces from the JBoss RichFaces Downloads area at *http://www.jboss.org/richfaces/download.html*. The binary files (available in `.bin.zip` or `.bin.tar.gz` archives) contain a compiled, ready-to-use version of RichFaces with a set of basic skins.

   - **Compiling from source**

     Instead of downloading the pre-compiled binaries, you can download the source files and compile them yourself. Refer to *Section 3.6, “Compiling from source code”* for further instructions.

2. **Unzip archive**

   Create a new directory named `RichFaces`, then unzip the archive containing the binaries there.

2.3. Creating a project with JBoss Tools

Follow the procedure in this section to create a new RichFaces application with JBoss Tools.

1. **Create a new project**

   Create a new project based on the JSF 2 environment. In JBoss Tools, select **File**+**New** → **JSF Project** from the menu. Name the project, select **JSF 2** from the **JSF Environment** drop-down box, and click the **Finish** button to create the project.

2. **Add the RichFaces libraries to the project**

   Add `core-ui.jar`, `richfaces-api.jar`, and `richfaces-impl.jar` into your project by copying them from the location where you unzipped the RichFaces archive to the `WebContent/WEB-INF/lib/` directory of your project in **JBoss Tools**.

3. **Reference the tag libraries**

   The RichFaces tag libraries need to be referenced on each XHTML page in your project:

```
<ui:composition xmlns="http://www.w3.org/1999/xhtml"
                xmlns:ui="http://java.sun.com/jsf/facelets"
                xmlns:a4j="http://richfaces.org/a4j"
                xmlns:rich="http://richfaces.org/rich">
    ...
</ui:composition>
```

You are now ready to begin constructing your RichFaces applications. RichFaces components can be dragged and dropped into your application's XHTML pages from the RichFaces palette in JBoss Tools, shown in *Figure 2.1, “RichFaces palette in JBoss Tools”*

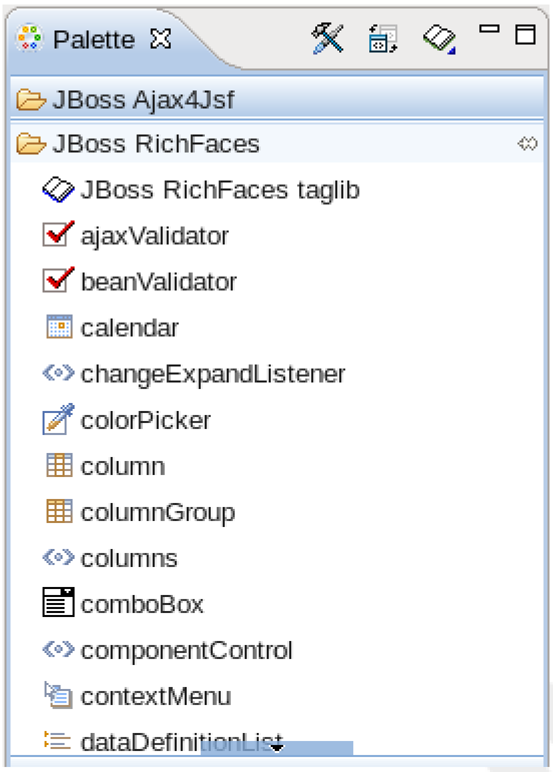


Figure 2.1. RichFaces palette in JBoss Tools

2.4. Creating a project with Maven

Apache Maven is a build automation and project management tool for Java projects. Follow the instructions in this section to create a Maven project for RichFaces.

2.4.1. Setting up Maven

Maven can be downloaded and installed from Apache's website at *http://maven.apache.org/download.html*. Version 2.2.1 is recommended.

Once Maven has been installed, no further configuration is required to begin building Maven projects.

2.4.2. Using the RichFaces project archetype

A Maven archetype is a template for creating projects. Maven uses an archetype to generate a directory structure and files for a particular project, as well as creating `pom.xml` files that contain build instructions.

The RichFaces Component Development Kit includes a Maven archetype named `richfaces-archetype-simpleapp` for generating the basic structure and requirements for a RichFaces application project. Maven can obtain the archetype from the JBoss repository at `https://repository.jboss.org/nexus/content/groups/public/`. The archetype is also included with the RichFaces source code. Follow the procedure in this section to generate a new Maven-based RichFaces project using the archetype.

1. **Add required repository**

   The details for the JBoss repository need to be added to Maven so it can access the archetype. Add a profile in the *maven_installation_folder*/conf/settings.xml file under the <profiles> element:

```
<profiles>
    ...
    <profile>
        <id>jboss-public-repository</id>
        <repositories>
            <repository>
                <id>jboss-public-repository-group</id>
                <name>JBoss Public Maven Repository Group</name>
                    <url>https://repository.jboss.org/nexus/content/groups/
public/</url>
                <layout>default</layout>
                <releases>
                    <enabled>true</enabled>
                    <updatePolicy>never</updatePolicy>
                </releases>
                <snapshots>
                    <enabled>true</enabled>
                    <updatePolicy>never</updatePolicy>
                </snapshots>
            </repository>
        </repositories>
        <pluginRepositories>
            <pluginRepository>
                <id>jboss-public-repository-group</id>
                <name>JBoss Public Maven Repository Group</name>
                    <url>https://repository.jboss.org/nexus/content/groups/
public/</url>
                <layout>default</layout>
                <releases>
                    <enabled>true</enabled>
                    <updatePolicy>never</updatePolicy>
                </releases>
                <snapshots>
                    <enabled>true</enabled>
                    <updatePolicy>never</updatePolicy>
                </snapshots>
            </pluginRepository>
        </pluginRepositories>
    </profile>
```

```
</profiles>
```

The profile then needs to be activated in the `<activeProfiles>` element:

```
<activeProfiles>
    <activeProfile>jboss-public-repository</activeProfile>
</activeProfiles>
```

2. **Generate the project from the archetype**

   The project can now be generated with the `richfaces-archetype-simpleapp` archetype. Create a new directory for your project, then run the following Maven command in the directory:

```
mvn archetype:generate -DarchetypeGroupId=org.richfaces.archetypes
 -DarchetypeArtifactId=richfaces-archetype-simpleapp -
DarchetypeVersion=4.0.0-SNAPSHOT -DgroupId=org.docs.richfaces -
DartifactId=new_project
```

   The following parameters can be used to customize your project:

   `-DgroupId`
   Defines the package for the Managed Beans

   `-DartifactId`
   Defines the name of the project

   The command generates a new RichFaces project with the following structure:

```
new_project
 ### pom.xml
 ### src
  ### main
      ### java
      #   ### org
      #       ### docs
      #           ### richfaces
      #               ### RichBean.java
      ### webapp
          ### index.xhtml
          ### templates
          #   ### template.xhtml
          ### WEB-INF
              ### faces-config.xml
              ### web.xml
```

3. **Add test dependencies (optional)**

   Your root directory of your project contains a project descriptor file, `pom.xml`. If you wish to include modules for test-driven JSF development, add any dependencies for the tests to the `pom.xml` file. For full details on how to use the jsf-test project, refer to *http://community.jboss.org/wiki/TestDrivenJSFDevelopment* [http://community.jboss.org/docs/DOC-13155].

4. **Build the project**

   Build the project from the command line by entering the `mvn install` command.

   The `BUILD SUCCESSFUL` message indicates the project has been assembled and is ready to import into an IDE (integrated development environment), such as JBoss Tools.

5. **Import the project into an IDE**

   Import the Maven project into your IDE. For **Eclipse** and **JBoss Tools**, you can import the project using the M2Eclipse plug-in.

   To install the plug-in, choose **Help** → **Install New Software** from the menu. Type `Maven` to locate the **Maven Integration for Eclipse Update Site** entry, then type `Maven` in the filter to show the available plug-ins. Follow the prompts to install the **Maven Integration for Eclipse** plug-in.

   With the plug-in installed, open the importing wizard by choosing **File** → **Import** from the menu. Select **Maven** → **Existing Maven Projects** as the import source and choose the `pom.xml` file for your project.

Your project is now ready to use. Once components and functionality have been added, you can run the application on a server and access it through a web browser at the address `http://localhost:8080/`*`jsf-app`*`/`.

2.5. Using RichFaces in existing JSF2 projects

RichFaces can be added to existing JSF2 projects by adding references to the new RichFaces libraries. Refer to *Step 2* and *Step 3* in *Section 2.3, “Creating a project with JBoss Tools”* for details.

RichFaces overview

Documentation in development

Some concepts covered in this chapter may refer to the previous version of Richfaces, version 3.3.3. This chapter is scheduled for review to ensure all information is up to date.

The RichFaces framework is a component library which enhances JSF Ajax capabilities, such that you don't need to write any extra JavaScript code or replace any existing components with new Ajax widgets. RichFaces also enables page-wide Ajax support instead of the traditional component-wide support. Events can be defined on pages that invoke Ajax requests. After an Ajax request, the areas of a page that are synchronized with the JSF Component Tree can themselves change data on the server according to events fired on the client.

Figure 3.1, “Request processing flow” illustrates how requests are processed in the RichFaces framework.

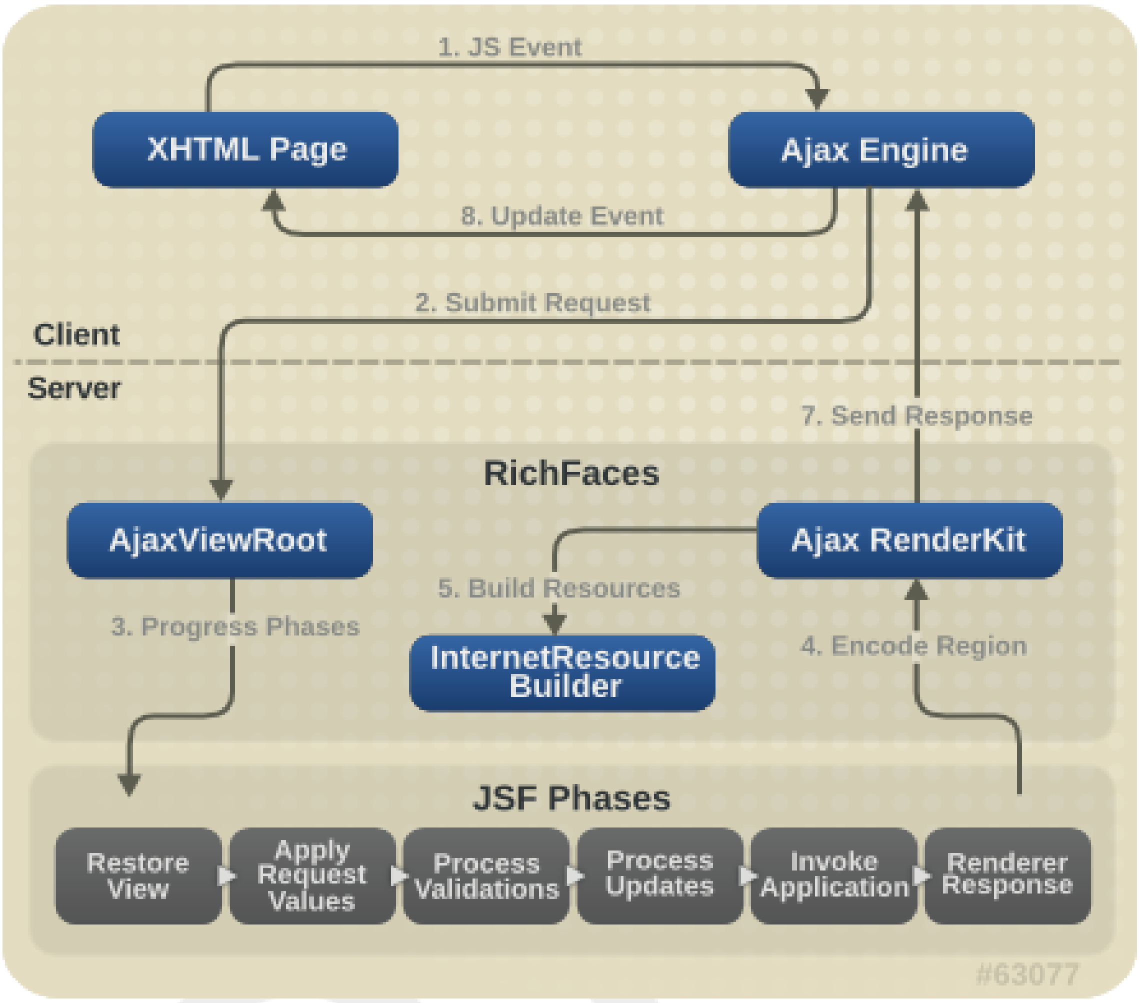


Figure 3.1. Request processing flow

Using JSF tags, RichFaces allows different parts of a JSF page to be updated with an Ajax request. JSF pages using RichFaces do not change from "regular" JSF pages, and additional JavaScript code is not required.

3.1. Full technical requirements

RichFaces has been developed with an open architecture to be compatible with a wide variety of environments.

3.1.1. Server requirements

A Java application server or servlet container is required for running RichFaces applications. RichFaces supports the following servers:

- Apache Tomcat 6.0 and higher
- BEA WebLogic 9.1 – 10.0
- JBoss 4.2 and higher

- Geronimo 2.0 and higher
- Glassfish (J2EE 5 and JEE 6)
- Resin 3.1
- Sun Application Server 9 (J2EE 1.5)
- Websphere 7.0 and higher

3.1.2. Client requirements

Clients accessing RichFaces applications require a web browser. Richfaces supports the following web browsers:

Linux environments

- Firefox 3.0 and higher
- Google Chrome
- Opera 9.5 and higher

Mac OS environments

- Firefox 3.5 and higher
- Google Chrome
- Safari 3.0 and higher

Microsoft Windows environments

- Firefox 3.0 and higher
- Google Chrome
- Internet Explorer 7.0 and higher
- Opera 9.5 and higher
- Safari 3.0 and higher

3.1.3. Development requirements

Developing applications with the RichFaces framework requires the Java Development Kit (JDK), an implementation of JavaServer Faces (JSF), and a development environment.

Java Development Kit (JDK)
: RichFaces supports the following JDK versions:

  - JDK 1.5 and higher

JavaServer Faces (JSF)

RichFaces supports the following JSF implementations and frameworks:

- MyFaces 2 and higher
- Seam 2 and higher
- Sun JSF-RI 2 and higher

Development environment

RichFaces can be developed using most Java development environments. The following are recommended, and used for examples in this guide:

- JBoss Tools 3.1 and higher
- Maven 2.1.0 and higher (2.2.1 recommended)

3.2. Architecture

The important elements of the RichFaces framework are as follows:

- Ajax Action Components
- Ajax Containers
- Skins and Theming
- RichFaces JavaScript Engine

Read this section for details on each element.

3.2.1. Ajax Action Components

The RichFaces framework includes several Ajax Action Components: `<a4j:commandButton>`, `<a4j:commandLink>`, `<a4j:poll>`, `<a4j:support>`, and more. Use Ajax Action Components to send Ajax requests from the client side.

3.2.2. Ajax Containers

`AjaxContainer` *(name possibly changed in release)* is an interface that describes an area on a JSF page that is decoded during an Ajax request. `AjaxViewRoot` and `AjaxRegion` are implementations of this interface.

3.2.3. Skins and theming

RichFaces includes extensive support for application skinning. Skinning is a high-level extension to traditional CSS (Cascading Style Sheets) which allows the color scheme and appearance of an application to be easily managed. The skins simplify look-and-feel design by allowing multiple elements of the interface to be handled as manageable features, which have associated color palettes and styling. Application skins can additionally be changed on the fly during run-time, allowing user experiences to be personalized and customized.

For full details on skinning and how to create skins for the components in your application, refer to *Chapter 6, Skinning and theming*.

3.2.4. RichFaces JavaScript Engine

The RichFaces JavaScript Engine runs on the client side. It can update different areas on a JSF page based on an Ajax response. It is not necessary to use the JavaScript code directly, as it is available automatically.

3.3. Technologies

RichFaces originated from the *Ajax4jsf* project, an open-source web application framework that added Ajax capabilities to the JavaServer Faces (JSF) framework. The RichFaces components were split into a separate commercial component library, then later both the Ajax4jsf and RichFaces libraries were re-combined under the RichFaces name.

RichFaces 4.0 features full JSF2 integration and uses standard web application technologies such as JavaScript, XML (Extensible Markup Language), and XHTML (Extensible Hypertext Markup Language).

3.4. Differences between JSF and RichFaces mechanisms

- JavaServer Faces (JSF) declares render and execute processes on the client side, while RichFaces declares server-side definitions of lists.
- RichFaces components uses their own renderers. In the *Render Response Phase*, the RichFaces framework makes a traversal of the component tree, calls its own renderer, and passes the result to the Faces Response.

3.5. Restrictions

The following restrictions apply to applications implementing the RichFaces framework:

- Any Ajax framework should not append or delete elements on a page, but should instead replace them. For successful updates, an element with the same identifier as in the response must exist on the page. If it is necessary to append code to a page, include a placeholder for it (an empty element).
- `<f:verbatim>` should not be used for self-rendered containers, since it is transient and not saved in the tree.
- The RichFaces `ViewHandler` puts itself in front of the Facelets `ViewHandlers` chain.

3.6. Compiling from source code

The source code for the RichFaces framework can be downloaded and compiled manually rather than using the pre-compiled binaries.

1. **Download source code**

   - **JBoss RichFaces Downloads area**

     Download the source files (also available in `.bin.zip` or `.bin.tar.gz` archives) from the JBoss RichFaces Downloads area at *http://www.jboss.org/richfaces/download.html*.

   - **Anonymous SVN repository**

     Alternatively, the source files can be downloaded from the anonymous SVN repository at *http://anonsvn.jboss.org/repos/richfaces/root/* using the following command:

     ```
     svn co http://anonsvn.jboss.org/repos/richfaces/root/
     ```

2. **Unzip archive**

   Create a new directory named `RichFaces`, then unzip the archive containing the source code there.

3. **Configure Maven with JBoss developer settings**

   To compile the RichFaces source code, Maven requires access to JBoss development repositories. Edit the *`maven_installation_folder`*`/conf/settings.xml` file and add the following settings:

   Server definitions

   ```
   <servers>
       <server>
           <id>jboss-developer-repository-group</id>
           <username>username</username>
           <password>password</password>
       </server>
       <server>
           <id>jboss-screenshots-repository</id>
           <username>username</username>
           <password>password</password>
       </server>
       <server>
           <id>jboss-releases-repository</id>
           <username>username</username>
           <password>password</password>
       </server>
       ...
   </servers>
   ```

Change the *`username`* and *`password`* in your server definitions to your JBoss.org username and password.

Mirror definitions

```
<mirrors>
    <mirror>
        <id>jboss-developer-repository-group</id>
        <mirrorOf>*,!jboss-deprecated</mirrorOf>
        <name>JBoss.org Developer Repository Group</name>
       <url>https://repository.jboss.org/nexus/content/groups/developer/
</url>
    </mirror>
    ...
</mirrors>
```

Profile definitions

```
<profiles>
    <!-- Redefine the Maven central repository to enable snapshots.  The
 url will be replaced by the mirror -->
    <profile>
        <id>jboss-nexus</id>
        <repositories>
            <repository>
                <id>central</id>
                <name>Central repository proxy</name>
                <url>replaced by mirror settings</url>
                <layout>default</layout>
                <releases>
                    <enabled>true</enabled>
                </releases>
                <snapshots>
                    <enabled>true</enabled>
                    <updatePolicy>never</updatePolicy>
                </snapshots>
            </repository>
        </repositories>
        <pluginRepositories>
            <pluginRepository>
                <id>central</id>
                <url>replaced by mirror settings</url>
                <releases>
                    <enabled>true</enabled>
                </releases>
                <snapshots>
```

```
                    <enabled>true</enabled>
                </snapshots>
            </pluginRepository>
        </pluginRepositories>
    </profile>
    ...
</profiles>
```

Activate profile

```
<activeProfiles>
    <activeProfile>jboss-nexus</activeProfile>
    ...
</activeProfiles>
```

4. **Compile using Maven**

   In the root directory of the unzipped source code, enter the following command to compile and build the RichFaces framework:

   ```
   mvn clean install
   ```

   Add any of the following options after the command to customize the build:

   `-P release,docs`
   : Maven additionally builds the documentation and release artifacts.

   `-D skipTests=true`
   : Maven skips the unit and functional tests, which completes the build faster.

   `-D checkstyle.skip=true`
   : Maven skips the scans for checking style, which completes the build faster.

   `-D skip-source`
   : Maven does not produce any source `jar` files from the build.

   `-D skip-enforce`
   : Maven does not check for the correct JDK version, Maven version, and `SNAPSHOT` plug-in, and forces the build.

   `-D jsf-profile=`*`implementation`*
   : Maven tests builds and tests against the specified JSF implementation. The *`implementation`* value can be any of the following:

   - `jsf_ri`: The latest release of JSF RI (Mojarra). This is the default implemenation.

- `jsf_ri_javax`: The latest release of javax.faces.
- `jsf_ri_snapshot`: The latest snapshot version of JSF RI (Mojarra).
- `myfaces`: The latest release of MyFaces.
- `myfaces`: The latest snapshot version of MyFaces.

5. **Access compiled binaries**

   The compiled libraries are located in the following sub-directories of the root RichFaces directory:

   - `ui/assembly/target/dist/richfaces-ui-`*`version`*`-SNAPSHOT.jar`
   - `framework/api/target/richfaces-api-`*`version`*`-SNAPSHOT.jar`
   - `framework/impl/target/richfaces-impl-`*`version`*`-SNAPSHOT.jar`

   If Maven built the framework using the `-P release` option, the distribution package containing all three compiled libraries and reference documentation is located at `ui/assembly/target/dist/richfaces-ui-`*`version`*`-SNAPSHOT-bin.zip`.

You can now add the compiled libraries to your project as described in *Step 2* of *Section 2.3, “Creating a project with JBoss Tools”*.

Basic concepts

Documentation in development

Some concepts covered in this chapter may refer to the previous version of Richfaces, version 3.3.3. This chapter is scheduled for review to ensure all information is up to date.

Read this chapter for the basic concepts of using RichFaces in conjunction with Ajax and JavaServer Faces.

4.1. Sending an Ajax request

Many of the tags in the `a4j` and `rich` tag libraries are capable of sending Ajax requests from a JavaServer Faces (JSF) page. RichFaces tags hide the usual JavaScript activities that are required for an XMHTTPRequest object building and an Ajax request sending. Additionally the tags can determine which components of a JSF page are to be re-rendered as a result of the Ajax response; refer to *Section 4.2.1, “Partial page updates”* for details.

- The `<a4j:commandButton>` and `<a4j:commandLink>` tags are used to send an Ajax request on the `click` JavaScript event.
- The `<a4j:poll>` tag is used to send an Ajax request periodically using a timer.
- The `<a4j:ajax>` tag allows you to add Ajax functionality to standard JSF components and send Ajax request on a chosen JavaScript event, such as `keyup` or `mouseover`, for example.
- Most components in the `rich` tag library have built-in Ajax support. Refer to the *RichFaces Component Reference* for details on the use of each component.

4.2. Receiving events and client-side updates

Updates are made only to those regions specified using the `execute`. If no specific regions are declared, the whole page is updated when an Ajax response is received.

4.2.1. Partial page updates

Specific regions of a page can be defined through the use of container components such as `<a4j:region>`. These regions can then be specified with their `id` identifiers in the `render` attribute of a component so that when the component sends an Ajax request, only the specified regions are updated. In this way you can control which part of the JSF View is decoded on the server side when the Ajax request is sent. Multiple regions can be defined and sent, and regions can be nested inside other regions. Controls and components from third-party libraries contained in these regions are also updated.

Additionally, regions can be wrapped with the `<a4j:outputPanel ajaxRendered="true">` tag. This causes all contents of the region to be updated on every Ajax response, even if not explicitly listed in the requesting component's `render` attribute.

Setting the `limitRender` attribute to `true` will cause *only* those regions listed in the requesting component's `render` attribute to be updated. This overrides any regions with the `<a4j:outputPanel ajaxRendered="true">` tag.

Refer to the *RichFaces Component Reference* for further details on the common Ajax attributes used for partial page updates.

4.3. Component overview

The RichFaces framework is made up of two tag libraries: the `a4j` library and the `rich` library. The `a4j` tag library represents *Ajax4jsf*, which provides page-level Ajax support with core Ajax components. This allows developers to make use of custom Ajax behavior with existing components. The `rich` tag library provides Ajax support at the component level instead, and includes ready-made, self-contained components. These components don't require additional configuration in order to send requests or update.

For details on the use of the various components, refer to *RichFaces Component Reference*.

Advanced features

Documentation in development

Some concepts covered in this chapter may refer to the previous version of Richfaces, version 3.3.3. This chapter is scheduled for review to ensure all information is up to date.

Read this chapter for details on some of the advanced features and configuration possibilities for the RichFaces framework.

5.1. JSF2 integration

JavaServer Faces (JSF) is the Java-based web application framework upon which the RichFaces framework has been built. RichFaces is now integrated with JSF2, which features several improvements to the framework.

- The standard display technology used by JSF1 was JavaServer Pages (JSP). With JSP2, the standard display technology has been changed to Facelets, which is a more powerful and more efficient View Declaration Language (VLD) than JSP.

5.2. Performance optimization

The RichFaces framework includes several components designed to improve application performance. Script and style management can be optimized with resource-loading components such as `<a4j:loadBundle>`, `<a4j:loadScript>`, and `<a4j:loadStyle>`.

For further details on optimizing the performance of RichFaces applications, refer to the *Resources* and *Processing management* chapters in the *Component Reference Guide*.

5.3. Traffic control and queues

The RichFaces framework allows for queues to manage traffic from Ajax requests, events, and page updates. Controlling the message processing with a queue can make applications more efficient and avoid problems with data corruption. Basic queuing is available with all RichFaces components, and the `<a4j:queue>` component adds advanced queuing to standard JSF components.

For further details on RichFaces queue management, refer to the queuing details in the *Common Ajax attributes* chapter and the *Processing management* chapter in the *Component Reference Guide*.

5.4. Validation

The RichFaces framework features several validation components. These components can validate Ajax actions, or validate data against model-based constraints defined using **Hibernate Validator**.

For further details on RichFaces validation components, refer to the *Validation* chapter of the *Component Reference Guide*.

5.5. Script and style loading

Scripts and styles are normally loaded into a RichFaces application on demand. The default loading strategy can be altered to suit certain applications by specifying the strategy in the `web.xml` file.

5.5.1. `org.richfaces.LoadScriptStrategy`

The script-loading strategy is specified as follows:

```
<context-param>
    <param-name>org.richfaces.LoadScriptStrategy</param-name>
    <param-value>ALL</param-value>
</context-param>
```

The `<param-value>` element can be set to one of three values:

`ALL`
: All scripts are loaded when the application starts.

> **JavaScript file compression**
>
> When `org.richfaces.LoadScriptStrategy` is set to `ALL`, JavaScript file compression is turned off.

`DEFAULT`
: Scripts are loaded as required. If not otherwise specified, this is the normal script-loading behavior.

`NONE`
: No scripts are loaded. This can be useful for including scripts manually.

5.5.2. `org.richfaces.LoadStyleStrategy`

The style-loading strategy is specified as follows:

```
<context-param>
    <param-name>org.richfaces.LoadStyleStrategy</param-name>
    <param-value>ALL</param-value>
</context-param>
```

The `<param-value>` element can be set to one of three values:

`ALL`
: All styles from a single integrated style sheet are loaded when the application starts.

`DEFAULT`
: Styles are loaded as required. If not otherwise specified, this is the normal style-loading behavior.

`NONE`
: No styles are loaded. The default plain skin resets all color and font parameters to `null`. Any pre-defined styles for RichFaces are not used.

5.6. Error handling

RichFaces allows standard handlers to be defined for processing different application exceptions. Custom JavaScript can be executed when these exceptions occur.

To define handlers for application exceptions, add the following code to your `web.xml` file:

```
<context-param>
    <param-name>org.ajax4jsf.handleViewExpiredOnClient</param-name>
    <param-value>true</param-value>
</context-param>
```

MyFaces compatibility

Custom error handlers for the `onError` and `onExpire` events do not work under MyFaces. MyFaces handles exceptions through its internal debug page. Use the following code in the `web.xml` file to prevent this behavior in MyFaces:

```
<context-param>
    <param-name>org.apache.myfaces.ERROR_HANDLING</param-name>
    <param-value>false</param-value>
</context-param>
```

5.6.1. Handling request errors

To execute custom JavaScript code on the client when an error occurs during an Ajax request, redefine the standard `A4J.AJAX.onError` method, as shown in *Example 5.1, “Example request error”*.

Example 5.1. Example request error

```
A4J.AJAX.onError = function(req, status, message){
    window.alert("Custom onError handler "+message);
}
```

The function accepts three parameters:

`req`
: A string of parameters from the request that caused the error.

`status`
: The error number returned by the server.

`message`
: A default message for the error.

5.6.2. Handling session expiration errors

Redefine the `A4J.AJAX.onExpired` method to handle the expiration of a user's session, as shown in *Example 5.2, “Example session expiration error”*.

Example 5.2. Example session expiration error

```
A4J.AJAX.onExpired = function(loc, expiredMsg){
    if(window.confirm("Custom onExpired handler "+expiredMsg+" for a location: "+loc)){
        return loc;
    } else {
        return false;
    }
}
```

The function accepts two parameters:

`loc`
: The URL of the current page, which can be updated on demand.

expiredMsg
A default message for the session expiration error.

5.7. Managing states

JavaServer Faces (JSF) has an advanced navigation mechanism that allows you to define navigation from one view to another. Navigation typically happens in a web application when a user moves from one page to another, but there is no switch mechanism between certain logical states in the same view. The RichFaces State API allows sets of states to be defined for the views, as well as any properties associated with these states.

Actually States is a map where the entry key is a name of the State and the value is a State map. Particular State map has entries with some names as keys and any objects as values that are used after the state activation. Thus, in the State map you could define any values, method bindings, or just some simple state variables (constants) which have different values for every State.

5.8. User roles

To check whether the logged-in user belongs to a certain user role, use the `rich:isUserInRole(Object)` function in RichFaces. The example demonstrates the function's use to render controls only for users with administrator privileges.

Example 5.3. User role example

Certain controls only need to be rendered for administrators.

1. **Create `admin` role**

   Create the `admin` role in the `web.xml` file:

```
<security-role>
    <role-name>admin</role-name>
</security-role>
```

2. **Implement authorization for users**

   Assign the `admin` role to users when they log in to the application as administrators.

3. **Use the `rich:isUserInRole(Object)` function**

   The `rich:isUserInRole(Object)` function can be used with the `rendered` attribute of any component:

```
<rich:editor value="#{bean.text}" rendered="#{rich:isUserInRole('admin')}" /
>
```

Skinning and theming

Documentation in development

Some concepts covered in this chapter may refer to the previous version of Richfaces, version 3.3.3. This chapter is scheduled for review to ensure all information is up to date.

Read this chapter for a guide to skinning and theming RichFaces applications, including how to implement themes, and details on customizing and extending skins.

6.1. What are skins?

Application skins are used with the RichFaces framework to change the appearance of an application through setting the colors and decoration of controls and components. Typically the appearance of web applications is handled through the CSS (Cascading Style Sheet) files associated with the application, but skinning allows the settings in a CSS file to be abstracted and easily edited. Using skins avoids repetitive coding and duplication in CSS files through the use of style variables and generalization. CSS files are not completely replaced: skins work as a high-level extension to standard CSS.

Each skin has a set of `skin-parameters`, which are used to define the theme palette and other elements of the user interface. These parameters work together with regular CSS declarations, and can be referred to from within CSS using JavaServer Faces Expression Language (EL).

The skinning feature of RichFaces also allows themes to be changed at runtime, so users can personalize an application's appearance.

6.2. Using skins

RichFaces includes a number of predefined skins. These skins can be used in RichFaces web applications by specifying the skin name in the `org.richfaces.SKIN` context parameter in the `web.xml` settings file. The predefined skins are as follows:

- `DEFAULT`
- `plain`, which contains no skin parameters and is intended for embedding RichFaces components into existing projects with their own styles.
- `emeraldTown`
- `blueSky`
- `wine`
- `japanCherry`

- `ruby`
- `classic`
- `deepMarine`
- `laguna`
- `darkX`
- `glassX`

To add one of these skins to your application, add the `org.richfaces.SKIN` context parameter to the `web.xml` configuration file:

```
<context-param>
    <param-name>org.richfaces.SKIN</param-name>
    <param-value>skin_name</param-value>
</context-param>
```

6.3. Customizing skins

RichFaces skins are designed to use a combination of styling elements. Themes for components can be applied using any of the following style classes:

A default style class inserted into the framework
: Style classes contain skin parameters linked to constant theme styles in the skin. Each component has a class style defining a default representation level. Application interfaces can be modified by altering the values of skin parameters in the skin itself.

A style class extending the skin
: A custom style class can be added to the skin, working in conjunction with CSS classes of the same name. All components referencing the class are extended in the same way.

User style class
: Components can use the `styleClass` attribute to redefine specific component elements. As such, the appearance of an individual component can be customized according to a CSS style parameter specified in the class.

Example 6.1. Simple skinning example

Using any component, such as a panel, without specifying a `styleClass` will use the default skin parameters for that component.

```
<rich:panel>...</rich:panel>
```

When rendered for display, the panel consists of two HTML elements: a wrapper `<div>` element and a `<div>` element for the body of the panel. The wrapper element for a panel without a specified `styleClass` is rendered as follows:

```
<div class="dr-pnl rich-panel">
    ...
</div>
```

`dr-pnl` refers to a CSS class specified in the framework. The CSS class uses skin parameters for generic theme styles:

- The `background-color` CSS class attribute is defined by the `generalBackgroundColor` skin parameter.
- The `border-color` CSS class attribute is defined by the `panelBorderColor` skin parameter.

Changing the definitions for `generalBackgroundColor` or `panelBorderColor` in the skin will cause all panels in the application to change.

If a `styleClass` attribute is used, the specified style class is applied to the component, which could extend or override the default styles.

```
<rich:panel styleClass="customClass">...</rich:panel>
```

The `customClass` style is added to the CSS, and is applied to the component when it is rendered for display:

```
<div class="dr-pnl rich-panel customClass">
    ...
</div>
```

6.4. Skin parameter tables in RichFaces

Table 6.1, “Parameter settings for the blueSky skin” lists the default values for the parameter settings in the `blueSky` skin. These values can be customized and extended for a unique application theme as described in *Section 6.3, “Customizing skins”*.

Table 6.1. Parameter settings for the `blueSky` skin

Parameter name	Default value
`headerBackgroundColor`	`#BED6F8`
`headerGradientColor`	`#F2F7FF`

Parameter name	Default value
headTextColor	#000000
headerWeightFont	bold
generalBackgroundColor	#FFFFFF
generalTextColor	#000000
generalSizeFont	11px
generalFamilyFont	Arial, Verdana, sans-serif
controlTextColor	#000000
controlBackgroundColor	#ffffff
additionalBackgroundColor	#ECF4FE
shadowBackgroundColor	#000000
shadowOpacity	1
panelBorderColor	#BED6F8
subBorderColor	#ffffff
tabBackgroundColor	#C6DEFF
tabDisabledTextColor	#8DB7F3
trimColor	#D6E6FB
tipBackgroundColor	#FAE6B0
tipBorderColor	#E5973E
selectControlColor	#E79A00
generalLinkColor	#0078D0
hoverLinkColor	#0090FF
visitedLinkColor	#0090FF
headerSizeFont	11px
headerFamilyFont	Arial, Verdana, sans-serif
tabSizeFont	11px
tabFamilyFont	Arial, Verdana, sans-serif
buttonSizeFont	11px
buttonFamilyFont	Arial, Verdana, sans-serif
tableBackgroundColor	#FFFFFF
tableFooterBackgroundColor	#cccccc
tableSubfooterBackgroundColor	#f1f1f1
tableBorderColor	#C0C0C0

6.5. Changing skins at runtime

The user can change skins at runtime if a managed bean is used to access the skin.

1. **Create the skin bean**

   The skin bean is a simple interface to manage the skin:

```
public class SkinBean {

    private String skin;

    public String getSkin() {
        return skin;
    }
    public void setSkin(String skin) {
        this.skin = skin;
    }
}
```

2. **Reference the skin bean**

   Use EL (Expression Language) to reference the skin bean from the `web.xml` settings file.

```
<context-param>
    <param-name>org.richfaces.SKIN</param-name>
    <param-value>#{skinBean.skin}</param-value>
</context-param>
```

3. **Set initial skin**

   The application needs an initial skin to display before the user chooses an alternative skin. The initial skin is specified in the `web.xml` configuration file.

```
<managed-bean>
    <managed-bean-name>skinBean</managed-bean-name>
    <managed-bean-class>SkinBean</managed-bean-class>
    <managed-bean-scope>session</managed-bean-scope>
    <managed-property>
        <property-name>skin</property-name>
        <value>classic</value>
    </managed-property>
</managed-bean>
```

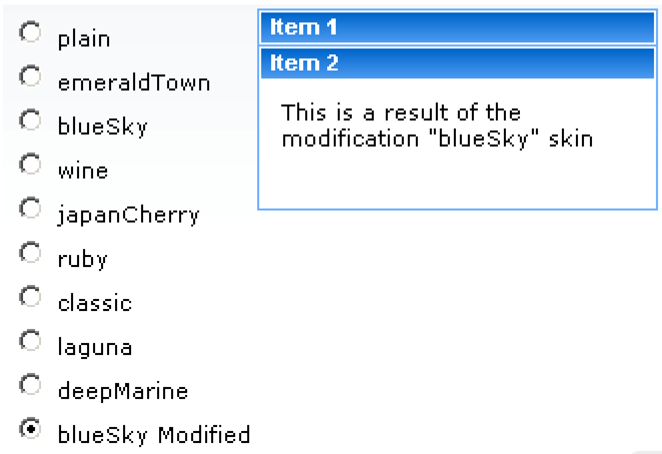
Example 6.2. Skin changing example

This example renders a list of radio buttons from which the user can choose their desired skin. The chosen skin is then applied to the panel bar items.

```
<h:form>
    <div style="display: block; float: left">

<h:selectOneRadio value="#{skinBean.skin}" border="0" layout="pageDirection" title="Changing
 skin" style="font-size: 8; font-family: comic" onchange="submit()">
            <f:selectItem itemLabel="plain" itemValue="plain" />
            <f:selectItem itemLabel="emeraldTown" itemValue="emeraldTown" />
            <f:selectItem itemLabel="blueSky" itemValue="blueSky" />
            <f:selectItem itemLabel="wine" itemValue="wine" />
            <f:selectItem itemLabel="japanCherry" itemValue="japanCherry" />
            <f:selectItem itemLabel="ruby" itemValue="ruby" />
            <f:selectItem itemLabel="classic" itemValue="classic" />
            <f:selectItem itemLabel="laguna" itemValue="laguna" />
            <f:selectItem itemLabel="deepMarine" itemValue="deepMarine" />
         <f:selectItem itemLabel="blueSky Modified" itemValue="blueSkyModify" />
        </h:selectOneRadio>
    </div>
    <div style="display: block; float: left">
        <rich:panelBar height="100" width="200">
              <rich:panelBarItem label="Item 1" style="font-family: monospace;
 font-size: 12;">
                Changing skin in runtime
            </rich:panelBarItem>

              <rich:panelBarItem label="Item 2" style="font-family: monospace;
 font-size: 12;">
                This is a result of the modification "blueSky" skin
            </rich:panelBarItem>
        </rich:panelBar>
    </div>
</h:form>
```



This is a result of the modification "blueSky" skin

Figure 6.1. Skin changing example

6.6. Creating a new skin

1. **Create the skin file**

   The name of the skin file should follow the format `new_skin_name.skin.properties` and is placed in either the `META-INF/skins/` directory or the classpath directory of your project.

2. **Define skin constants**

   Add skin parameter constants and values to the file. *Example 6.3, "blueSky.skin.properties file"* shows how the skin parameters listed in *Table 6.1, "Parameter settings for the blueSky skin"* are included in the skin file.

   ### Example 6.3. `blueSky.skin.properties` file

   The `blueSky.skin.properties` file lists all the skin parameter constants for the skin. It can be extracted from the `/META-INF/skins` directory in the richfaces-impl-*version*.jar package.

```
#Colors
headerBackgroundColor=#BED6F8
headerGradientColor=#F2F7FF
headerTextColor=#000000
headerWeightFont=bold

generalBackgroundColor=#FFFFFF
generalTextColor=#000000
generalSizeFont=11px
generalFamilyFont=Arial, Verdana, sans-serif

controlTextColor=#000000
controlBackgroundColor=#ffffff
additionalBackgroundColor=#ECF4FE
```

```
shadowBackgroundColor=#000000
shadowOpacity=1

panelBorderColor=#BED6F8
subBorderColor=#ffffff

tabBackgroundColor=#C6DEFF
tabDisabledTextColor=#8DB7F3

trimColor=#D6E6FB

tipBackgroundColor=#FAE6B0
tipBorderColor=#E5973E

selectControlColor=#E79A00

generalLinkColor=#0078D0
hoverLinkColor=#0090FF
visitedLinkColor=#0090FF

# Fonts
headerSizeFont=11px
headerFamilyFont=Arial, Verdana, sans-serif

tabSizeFont=11
tabFamilyFont=Arial, Verdana, sans-serif

buttonSizeFont=11
buttonFamilyFont=Arial, Verdana, sans-serif

tableBackgroundColor=#FFFFFF
tableFooterBackgroundColor=#cccccc
tableSubfooterBackgroundColor=#f1f1f1
tableBorderColor=#C0C0C0
tableBorderWidth=1px

#Calendar colors
calendarWeekBackgroundColor=#F5F5F5

calendarHolidaysBackgroundColor=#FFEBDA
calendarHolidaysTextColor=#FF7800

calendarCurrentBackgroundColor=#FF7800
calendarCurrentTextColor=#FFEBDA

calendarSpecBackgroundColor=#E4F5E2
calendarSpecTextColor=#000000
```

```
warningColor=#FFE6E6
warningBackgroundColor=#FF0000

editorBackgroundColor=#F1F1F1
editBackgroundColor=#FEFFDA

#Gradients
gradientType=plain
```

Alternatively, instead of redefining an entire new skin, your skin can use an existing skin as a base on which to build new parameters. Specify a base skin by using the `baseSkin` parameter in the skin file, as shown in *Example 6.4, “Using a base skin”*.

Example 6.4. Using a base skin

This example takes the `blueSky` skin as a base and only changes the `generalSizeFont` parameter.

```
baseSkin=blueSky
generalSizeFont=12pt
```

3. **Reference skin definition**

   Add a skin definition `<context-param>` to the `web.xml` settings file of your application:

```
<context-param>
    <param-name>org.richfaces.SKIN</param-name>
    <param-value>new_skin_name</param-value>
</context-param>
```

6.7. Skinning standard controls

6.7.1. Skinning standard JSF components

The RichFaces framework can also use skinning to theme JSF (JavaServer Faces) components in addition to RichFaces components. Follow these additional steps to skin JSF components.

1. **Register a custom render kit**

   The custom render kit is created by registering it in the `faces-config.xml` configuration file:

```
<render-kit>
    <render-kit-id>new_skin_name</render-kit-id>
```

```
                                                                        <render-kit-
class>org.ajax4jsf.framework.renderer.ChameleonRenderKitImpl</render-kit-
class>
</render-kit>
```

2. **Register custom renderers for the JSF component**

   Add custom renderers in the `faces-config.xml` configuration file for each JSF component you want to skin:

```
<renderer>
    <component-family>javax.faces.Command</component-family>
    <renderer-type>javax.faces.Link</renderer-type>
    <renderer-class>new_skin_name.HtmlCommandLinkRenderer</renderer-class>
</renderer>
```

3. **Reference the render kit in the skin file**

   Add the following to the top of the skin parameters file: `render.kit=`*`new_skin_name`*

6.7.2. Skinning standard HTML controls

Standard HTML controls and components used alongside RichFaces and JSF components can also be themed to create a cohesive user interface. The following HTML elements accept skinning:

- `<a>` (including `a:hover`, `a:visited` and other elements)
- `<fieldset>`
- `<hr>`
- `<input>`
- `<isindex>`
- `<keygen>`
- `<legend>`
- `<select>`
- `<textarea>`

Skinning for standard HTML controls can be included in one of two ways:

Automatic skinning
: The skinning style properties are automatically applied to controls based on their element names and attribute types. Specify the `org.richfaces.CONTROL_SKINNING` context parameter in the `web.xml` configuration file:

```
<context-param>
        <param-name>org.richfaces.CONTROL_SKINNING</param-name>
        <param-value>enable</param-value>
    </context-param>
```

Skinning with CSS classes

The skinning style properties are determined through CSS. This method is available by default, but can be disabled through the `org.richfaces.CONTROL_SKINNING_CLASSES` context parameter in the `web.xml` configuration file:

```
<context-param>
        <param-name>org.richfaces.CONTROL_SKINNING_CLASSES</param-name>
        <param-value>disable</param-value>
    </context-param>
```

When enabled, the parameter offers a predefined CSS class named `rich-container`. Reference the class from any container-like component, and the standard HTML controls in the container will be skinned. Standard HTML controls can also be specifically defined in the CSS; refer to the `org/richfaces/renderkit/html/css/basic_classes.xcss` file in the richfaces-ui.jar package for examples of specially-defined CSS classes with skin parameters for HTML controls.

6.7.2.1. Skinning levels for standard HTML controls

There are two levels of skinning for HTML controls, depending on whether the browser viewing the application includes rich visual styling capabilities, and whether the browser supports features of CSS2 and CSS3.
Browser lists may need to be updated.

Basic skinning

- Apple Safari
- Microsoft Internet Explorer 6
- Microsoft Internet Explorer 7 in `BackCompat` mode (refer to “`compatMode` Property” at *http://msdn.microsoft.com/en-us/library/ms533687(VS.85).aspx*
- Opera

Extended skinning

- Microsoft Internet Explorer 7 in standards-compliant mode
- Mozilla Firefox

If the browser type cannot be identified, the extended level is used. Set the level explicitly by adding the following context parameter to the `web.xml` configuration file, and specifying the `<param-value>` element as either `basic` or `extended`:

```
<context-param>
    <param-name>org.richfaces.CONTROL_SKINNING_LEVEL</param-name>
    <param-value>basic</param-value>
</context-param>
```

6.8. Defining skins for individual components

RichFaces uses XCSS (XML-formatted CSS) files to add extra functionality to the skinning process. XCSS files can contain all the styling information for each RichFaces component in the library.

XCSS files contain mappings between CSS properties and skin parameters. The `name` attribute of the `<u:selector>` element is the name of the CSS selector. Each `<u:style>` element defines a CSS property with the `name` attribute as its name. Using the `skin` attribute specifies a skin parameter from the current skin file, while using the `value` attribute enters the literal value in the CSS file. An example of this is shown in *Example 6.5, “XCSS style mappings”*.

Example 6.5. XCSS style mappings

The XCSS code for the CSS selector named `.rich-component-name` is as follows:

```
<u:selector name=".rich-component-name">
    <u:style name="background-color" skin="additionalBackgroundColor" />
    <u:style name="border-color" skin="tableBorderColor" />
    <u:style name="border-width" skin="tableBorderWidth" />
    <u:style name="border-style" value="solid" />
</u:selector>
```

This renders the following CSS code to be read by a standard browser:

```
.rich-component-name {
     background-color: additionalBackgroundColor; /*the value of the constant
 defined by your skin*/
    border-color: tableBorderColor; /*the value of the constant defined by your
 skin*/
    border-width: tableBorderWidth; /*the value of the constant defined by your
 skin*/
    border-style: solid;
}
```

CSS selectors with identical skinning properties can be listed in a single `name` attribute of a `<u:selector>` element, separated by commas.

```
<u:selector  name=".rich-ordering-control-disabled,  .rich-ordering-control-top, .rich-ordering-control-bottom, .rich-ordering-control-up, .rich-ordering-control-down">
    <u:style name="border-color" skin="tableBorderColor" />
</u:selector>
```

Style properties can be modified using XML-based XCSS code, or using embedded standard CSS code, as shown in *Example 6.6, “Using XCSS code or standard CSS code”*

Example 6.6. Using XCSS code or standard CSS code

Using XCSS code. XCSS code follows an XML structure, using `<u:selector>` elements to define style classes and `<u:style>` elements for each style parameter.

```
...
<u:selector name=".rich-calendar-cell">
    <u:style name="border-bottom-color" skin="panelBorderColor"/>
    <u:style name="border-right-color" skin="panelBorderColor"/>
    <u:style name="background-color" skin="tableBackgroundColor"/>
    <u:style name="font-size" skin="generalSizeFont"/>
    <u:style name="font-family" skin="generalFamilyFont"/>
</u:selector>
...
```

Using standard CSS code. CSS code can be included in an XCSS file through the use of a `<f:verbatim>` element with a character data (CDATA) section.

```
<f:verbatim><![CDATA[
    ...
    .rich-calendar-cell {
        background: #537df8;
    }
    ...
]]></f:verbatim>
```

6.9. Plug-n-skin

Plug-n-skin is an alternate method to create, customize, and add a skin. The skin can be based on an existing RichFaces skin, and can include support for skinning standard HTML controls.

1. **Create a template**

   Use the Maven build and deployment tool to create the skin template by using the following command:

   ```
   mvn archetype:create -DarchetypeGroupId=org.richfaces.cdk -
   DarchetypeArtifactId=maven-archetype-plug-n-skin -DarchetypeVersion=RF-
   VERSION -DartifactId=ARTIFACT-ID -DgroupId=GROUP-ID -Dversion=VERSION
   ```

   Use the following parameters for the command:

   `archetypeVersion`
   : The version of RichFaces, for example, `4.0.0.GA`.

   `artifactId`
   : The artifact identifier or name of the project. The Maven template will be created in a directory using this name.

   `groupId`
   : The group identifier of the project.

   `version`
   : The version of your project, for example, `1.0`.

2. **Add the skin to the CDK**

   Change to the newly-created directory. Ensure it contains the `pom.xml` project file, then enter the following command to create a new skin and add it to the CDK (Component Development Kit):

   ```
   mvn cdk:add-skin -Dname=SKIN-NAME -Dpackage=SKIN-PACKAGE
   ```

   Use the following parameters for the command:

   `name`
   : The name of your new skin.

   `package`
   : The base package of the skin. By default, the group identifier is used.

   Use the following optional keys for advanced features:

   `baseSkin`
   : The skin to use as a base for the new skin.

`createExt`
: Use `createExt=true` to add extended CSS classes for skinning standard HTML controls.

The command creates the following files:

`src/main/java/`*`SKIN-PACKAGE`*`/`*`SKIN-NAME`*`/images/BaseImage.java`
: The base class to store images.

`src/test/java/`*`SKIN-PACKAGE`*`/`*`SKIN-NAME`*`/images/BaseImage.java`
: A test version of the base class to store images.

`src/main/resources/`*`SKIN-PACKAGE`*`/`*`SKIN-NAME`*`/css/`
: The directory that holds the XCSS files that define the themes for RichFaces components affected by the new skin.

  If the `createExt=true` parameter was used with the command, the following XCSS files are included for defining styles for standard HTML controls:

  - `extended_classes.xcss`
  - `extended.xcss`

`src/main/resources/`*`SKIN-PACKAGE`*`/`*`SKIN-NAME`*`/css/`*`SKIN-NAME`*`.properties`
: The file that contains the skin properties.

`src/main/resources/META-INF/skins/`*`SKIN-NAME`*`.xcss`
: A global XCSS file that imports the component-specific XCSS files.

  If the `createExt=true` parameter was used with the command, the following *`skin-name`*`-ext.xcss` file is included, which imports the XCSS files for standard HTML controls.

`src/main/config/resources/`*`SKIN-NAME`*`-resources.xml`
: The file that contains the description of all the files listed above.

3. **Edit XCSS files**

   Edit the XCSS files contained in the `src/main/resources/META-INF/skins/` directory. Refer to *Section 6.8, “Defining skins for individual components”* for instructions on how to edit XCSS files.

4. **Build the skin**

   After editing the XCSS files, build the skin by running the following command in the root directory of your skin project (the directory that contains the `pom.xml` file).

   ```
   mvn clean install
   ```

5. **Add the skin to the project configuration**

   Add the following context parameter to your project's `web.xml` configuration file to use the new skin in your application:

```
<context-param>
    <param-name>org.ajax4jsf.SKIN</param-name>
    <param-value>SKIN-NAME</param-value>
</context-param>
```