Java™ Portlet Specification

Working Document

Version 3.0, draft 1

Send comments about this document to: **issues@portletspec3.java.net**

This is a non-normative working document of the JSR 362 Portlet Specification 3.0 Expert Group. Additions, deletions, or other changes may be made at any time.

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Preface

This document is the Java™ Portlet Specification, v3.0. that describes the Java™ Portlet API.

Additional Sources

The specification is intended to be a complete and clear explanation of Java portlets, but if questions remain the following may be consulted:

- A reference implementation (RI) has been made available which provides a behavioral benchmark for this specification. Where the specification leaves implementation of a particular feature open to interpretation, developers may use the reference implementation as a model of how to carry out the intention of the specification
- A Technology Compatibility Kit (TCK) has been provided for assessing whether implementations meet the compatibility requirements of the Java™ Portlet API standard. The test results have normative value for resolving questions about whether an implementation is standard
- If further clarification is required, the working group for the Java™ Portlet API under the Java Community Process should be consulted, and is the final arbiter of such issues

Comments and feedback are welcomed, and will be used to improve future versions.

Who Should Read This Specification

The intended audience for this specification includes the following groups:

- Portal server vendors who want to provide portlet containers that conform to this standard
- Authoring tool developers who want to support web applications that conform to this specification
- Experienced portlet authors who want to understand the underlying mechanisms of portlet technology

We emphasize that this specification is not a user's guide for portlet developers and is not intended to be used as such.

API Reference

The full specifications of classes, interfaces, and method signatures that define the Java Portlet API, as well as the accompanying Javadoc™ documentation, is available online.

Other Java™ Platform Specifications

The following Java API specifications are referenced throughout this specification:

- Java Platform, Enterprise Edition ("Java EE"), version 7
- Java™ Servlet™, v3.1
- JavaServer Pages™, v2.2 (JSP™)

- JavaServer™ Faces, v2.2 (JSF™)
- The Java™ Architecture for XML Binding (JAXB) 2.2
- Contexts and Dependency Injection for the Java EE Platform 1.1

These specifications may be found at the Java Community Process website: https://www.jcp.org/en/home/index

Other Important References

The following Internet specifications provide information relevant to the development and implementation of the Portlet API and standard portlet engines:

- RFC 1630 Uniform Resource Identifiers (URI)
- RFC 5646 BCP 47, Tags for Identifying Languages
- RFC 1738 Uniform Resource Locators (URL)
- RFC 2396 Uniform Resource Identifiers (URI): Generic Syntax
- RFC 1808 Relative Uniform Resource Locators
- RFC 1945 Hypertext Transfer Protocol (HTTP/1.0)
- RFC 2045 MIME Part One: Format of Internet Message Bodies
- RFC 2046 MIME Part Two: Media Types
- RFC 2047 MIME Part Three: Message Header Extensions for non-ASCII text
- RFC 2048 MIME Part Four: Registration Procedures
- RFC 2049 MIME Part Five: Conformance Criteria and Examples
- RFC 2109 HTTP State Management Mechanism
- RFC 2145 Use and Interpretation of HTTP Version Numbers
- RFC 7230 Hypertext Transfer Protocol (HTTP/1.1): Message Syntax and Routing
- RFC 7231 Hypertext Transfer Protocol (HTTP/1.1): Semantics and Content
- RFC 7232 Hypertext Transfer Protocol (HTTP/1.1): Conditional Requests
- RFC 7233 Hypertext Transfer Protocol (HTTP/1.1): Range Requests
- RFC 7234 Hypertext Transfer Protocol (HTTP/1.1): Caching
- RFC 7235 Hypertext Transfer Protocol (HTTP/1.1): Authentication
- RFC 2616 Hypertext Transfer Protocol (HTTP/1.1)
- RFC 2617 HTTP Authentication: Basic and Digest Authentication
- ISO 639 Code for the representation of names of languages
- ISO 3166 Code (Country) list
- OASIS Web Services for Remote Portlets (WSRP)
- CC/PP Processing, JSR 188
- W3C: Composite Capability/Preference Profiles (CC/PP): Structure and Vocabularies

Online versions of these RFC and ISO documents are at:

- `http://www.rfc-editor.org/`
- `http://www.ics.uci.edu/pub/ietf/http/related/iso639.txt`
- `http://www.iso.org/iso/en/prods-services/iso3166ma/index.html`

The World Wide Web Consortium http://www.w3.org/ is a definitive source of HTTP related information affecting this specification and its implementations.

The WSRP Specification can be found in the OASIS web site

http://www.oasis-open.org/.

The Extensible Markup Language (XML) is used for the specification of the portlet deployment descriptor described in Chapter 27 Packaging and Deployment, and the portlet deployment descriptor schema presented in Appendix E Deployment Descriptor Schema. More information about XML can be found at the following website: http://www.xml.org/

Terminology

The key words MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL in this document are to be interpreted as described in [RFC2119].

Providing Feedback

We welcome any and all feedback about this specification. Please e-mail your comments to jsr362-observers@portletspec3.java.net.

Please note that due to the volume of feedback that we receive, you will not normally receive a reply from an engineer. However, each and every comment is read, evaluated, and archived by the specification team.

Acknowledgements

The Java Portlet Specification version 3.0 is the result of diligent efforts of the JSR 362 expert group working under the auspices of the Java Community Process (JCP).

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Chapter 1 Overview

1.1 What is a Portal?

A portal is a web based application that provides personalization, authentication, and content aggregation from different sources and hosts the presentation layer of information systems. Aggregation is the action of integrating content from different sources on a web page. A portal may have sophisticated personalization features to provide customized content to users. Portal pages may have different set of portlets creating content for different users.

1.2 What is a Portlet?

A portlet is an application that provides a specific piece of content (information or service) to be included as part of a portal page. It is managed by a portlet container that processes requests to generate dynamic content. Portlets are used by portals as pluggable user interface components that provide a presentation layer to information systems.

The content generated by a portlet called a fragment. A fragment is a piece of markup (e.g. HTML, XHTML, and WML) that adheres to certain rules so that it can be aggregated with other fragments to form a complete document. The content of a portlet is normally aggregated with the content of other portlets along with additional theme markup to form the portal page.

Web clients interact with portlets via a request/response paradigm implemented by the portal. Normally, users interact with content produced by portlets, for example by following links or submitting forms, resulting in portlet actions being received by the portal. The portal forwards these actions to the targeted portlets.

The content generated by a portlet may vary from one user to another depending on the user configuration for the portlet.

This specification will deal with portlets as Java technology-based web components.

1.3 What is a Portlet Container?

A portal provides infrastructure, known as the portlet container, for running portlets. The portlet container implements the programming interfaces described in this document to allow the portlets to obtain information about the request, to generate markup to be integrated into the complete portal web page, and to store state information.

A portlet container provides portlets with the required runtime environment and manages their lifecycle. It also provides persistent storage for portlet preferences. A portal sends requests to the portlet container in order to cause portlet method invocation.

A portlet container is not responsible for aggregating the content produced by the portlets. The portal handles content aggregation.

A portal and a portlet container can be built together as a single component or as separate components within a portal system.

1.4 Client-Side Support

The Portlet Specification provides a JavaScript module that runs on the web browser client. This module, known as the portlet hub, supports development of responsive web pages consisting of independently-developed portlets aggregated by the portal.

A portlet can make use of the portlet hub by providing appropriate JavaScript code within its markup.

1.5 An Example

The following is a typical sequence of events initiated when a user accesses the portal page:

- A client (e.g., a web browser) sends a form to the portal using an HTTP POST request.
- The request is received by the portal.
- The portal determines the target portlet on the portal page.
- The portal sends a request to the portlet container to cause the portlet to process the form.
- After form processing completes, the portal uses the portlet container to invoke each portlet in turn to obtain content fragments that can be included in the resulting portal page.
- The portal aggregates the output of the portlets along with theme markup to form a complete portal page and sends it back to the client.

1.6 Portlet State and Backend State

Previous versions of the Portlet Specification defined the idea of portlet state implicitly. Portlet Specification 3.0 explicitly introduces the portlet state concept composed of the portlet mode, window state, and the render parameters. The portlet state can be read in all portlet lifecycle methods but can be updated only during event and action request processing. The portlet state can be thought of as a view state that defines the information the portlet should display.

The backend state concerns the information itself that is displayed by the portlet. This may be data from a database or from a content management system. The backend state can change even though the portlet state remains unchanged.

To understand the difference between the portlet state and the backend state, consider the following example. Assume that the portlet state stored in a link specifies that page three of a long paginated list of order information from a database is to be displayed. Using this portlet state, the portlet will always display page three of the order list every time the link is clicked, even though the actual order information displayed changes as the backend state is updated due to new orders being entered and due to processing of the current orders.

1.7 Compatibility

The Java Portlet Specification version 3.0 extends the interfaces defined by its predecessor JSR 286 Portlet Specification 2.0 so as to support binary compatibility. Version 2.0 portlets (identified by a version 2.0 deployment descriptor) will run on a version 3.0 portlet container unchanged. Since the Portlet Specification 2.0 provides binary compatibility with JSR 168

Portlet Specification version 1.0 portlets, version 1.0 portlets will also run on a version 3.0 portlet container unchanged.

Portlet Specification version 3.0 portlet containers must support deployment of version 3.0, version 2.0 and version 1.0 portlets.

1.8 Relationship to Java Enterprise Edition

The Portlet API v3.0 is based on the Java Standard Edition 7.0 and Java Enterprise Edition v7.0. Portlet containers should at least meet the requirements described by the Java EE 7.0 specification for executing in a Java EE environment.

Since portlets provide functionality in a sense similar to that of servlets, this specification will use analogous concepts and names for portlet features that correspond to servlet features.

Contexts and Dependency Injection (CDI) is an important component of the Java EE specification. Use of CDI beans has become popular within the Java development community.

The Portlet Specification provides features that make it easy to use CDI beans when writing portlets. When a CDI container is present, the portlet container will instantiate portlets through the CDI container so that the CDI injection mechanism can be used within portlet classes. The portlet container will provide custom CDI scopes to support the portlet lifecycle.

1.9 Configuration

A portlet application is configured through a deployment descriptor in the same way that a servlet is configured. The portlet application corresponds to the web application. The portlet application consists of one or more portlets. The portlets are also declared within the deployment descriptor.

Beginning with Portlet Specification version 3.0, most configuration tasks can also be performed through use of annotations. This includes the portlet declarations as well.

Chapter 2 Relationship to the Servlet Specification

The *Servlet Specification* defines servlets as follows[1]:

"A servlet is a Java technology based web component, managed by a container that generates dynamic content. Like other Java-based components, servlets are platform independent Java classes that are compiled to platform neutral bytecode that can be loaded dynamically into and run by a Java enabled web server. Containers, sometimes called servlet engines, are web server extensions that provide servlet functionality. Servlets interact with web clients via a request/response paradigm implemented by the servlet container."

Portlets share many similarities with servlets:

- Portlets are Java technology based web components.
- Portlets are managed by a specialized container.
- Portlets generate dynamic content.
- Portlets lifecycle is managed by a container.
- Portlets interact with web client via a request/response paradigm.

Portlets differ in the following aspects from servlets:

- The portlet render method only generates markup fragments, not complete documents. The portal aggregates portlet markup fragments into a complete portal page.
- Portlets can only be invoked through URLs constructed via the portlet API.
- Web clients interact with portlets through a portal system.
- Portlets have more refined request handling then servlets. The Portlet Specification defines Action, Event, Header, Render and Resource requests. The portlet container recognizes the portlet request type and dispatches the request to the appropriate portlet lifecycle method.
- Portlets have predefined portlet modes and window states that indicate the function the portlet is performing and the amount of real estate the portlet requires on the portal page.
- Portlets can appear multiple times on a portal page.

Portlets have access to functionality not provided by servlets:

- Portlets have a means of accessing and storing persistent configuration and customization data.
- Portlets have a means of storing portlet state information in the form of render parameters, the portlet mode, and the window state.
- Portlets have access to user profile information.
- Portlets have URL rewriting functions for creating hyperlinks within their content, which allow portal-server agnostic creation of links and actions in page fragments.

[1] See the Servlet Specification Version 3.1, Section 1.1 What is a Servlet?

- Portlets can store transient data in the portlet session in two different scopes: the application-wide scope and the portlet private scope.
- Portlets can send and receive events from other portlets or can receive container defined events.

Portlets do not have access to the following functionality provided by servlets:

- Portlets may not set the character set encoding of the render response.
- Portlets may not directly access the URL of the client request to the portal.

The portlet has full control over the response when rendering resources via the `serveResource` call.

Because of these differences, the Expert Group has decided that portlets need to be a new component. Therefore, a portlet is not a servlet. This allows definition of a clear interface and behavior for portlets.

In order to reuse as much of the existing servlet infrastructure as possible, the Portlet Specification leverages functionality provided by the Servlet Specification wherever possible. This includes deployment, class loading, definition of web applications, web application lifecycle management, session management, and request dispatching. Many concepts and parts of the Portlet API have been modeled after the Servlet API.

Portlets, servlets, and JSPs are bundled in an extended web application called a portlet application. Portlets, servlets, and JSPs within the same portlet application share the same class loader, application context, and session.

2.1 Bridging from Portlets to Servlets/JSPs

Portlets can leverage servlets, JSPs and JSP tag-libraries for generating content.

A portlet can call servlets and JSPs in the same manner that a servlet can invoke other servlets and JSPs using a request dispatcher (see Chapter 25 Dispatching to JSPs and Servlets). To enable a seamless integration between portlets and servlets the Portlet Specification leverages many of the servlet objects.

When a servlet or JSP is called from within a portlet, the servlet request passed to the servlet or JSP is based on the portlet request and the servlet response passed to the servlet or JSP is based on the portlet response. A few of the consequences of this are listed below:

- Attributes set in the portlet request are available in the included servlet request (see Chapter 25).
- The portlet and the included servlet or JSP share the same output stream (see Chapter 25).
- Attributes set in the portlet session are accessible from the servlet session and vice versa (see Chapter 20 Sessions).

2.2 Using Servlet Application Lifecycle Events

The Java Servlet Specification describes a variety of servlet application lifecycle events. A servlet can register event listeners for these events. In the sense of the lifecycle events, the portlet objects `PortletContext` and `PortletSession` defined by this specification mirror their servlet counterparts. The lifecycle of the `PortletContext` is tied to that of the `ServletContext` of the web application. The attributes set in the `PortletContext` are mirrored in the `ServletContext`. The lifecycle of the `PortletSession` is tied to that of the

HttpSession of the web application. The attributes set in the PortletSession are mirrored in the HttpSession. Since this is the case, the servlet lifecycle listeners for ServletContext and HttpSession can also be used for PortletContext and PortletSession notifications.

Given that the portlet request is independent of the servlet request, the servlet request lifecycle listeners do not have a simple mapping to portlet requests. In order to allow portlets to leverage the servlet request listeners for portlets, the portlet container must create a servlet request mirroring the portlet request. In order to allow the servlet request listeners to distinguish between the case of a plain servlet request and a servlet request targeted towards a portlet, the portlet container must set the javax.portlet.lifecycle_phase request attribute in order to identify the servlet request representing a portlet request.

The following is the list of servlet listeners that also apply to portlets:

- The javax.servlet.ServletContextListener provides notifications about the servlet context and the corresponding portlet context.
- The javax.servlet.ServletContextAttributeListener provides notifications on attributes in the servlet context or the corresponding portlet context.
- The javax.servlet.http.HttpSessionActivationListener provides notifications on the activation or passivation of the HttpSession or the corresponding PortletSession.
- The javax.servlet.http.HttpSessionAttributeListener provides notifications on attributes of the HttpSession or the corresponding PortletSession.
- The javax.servlet.http.HttpSessionListener provides notifications about HttpSession or the corresponding PortletSession lifecycle changes.
- The javax.servlet.http.HttpSessionBindingListener provides notifications on binding of objects to the HttpSession or the corresponding PortletSession.
- The javax.servlet.ServletRequestListener provides notifications about changes to the HttpServletRequest or the mirrored portlet request of the current web application.
- The javax.servlet.ServletRequestAttributeEvent provides notifications about changes to the attributes of the HttpServletRequest or the mirrored portlet request of the current web application.

2.3 The Servlet Container - Portlet Container Relationship

The portlet container is an extension of the servlet container. As such, a portlet container can be built on top of an existing servlet container or it may implement all the functionality of a servlet container. Regardless of how a portlet container is implemented, its runtime environment is assumed to support at least *Java™ Servlet Specification Version 3.1*.

Chapter 3 Portlet Concepts

3.1 Portlets

Complex web sites often need to combine data from multiple sources to create a single web page. A shipping web site might need to show order information, user information, and a map, for example. These diverse types of information are accessed through different programming interfaces and protocols.

Often, the job of accessing, displaying, and updating a specific type of information is complex enough to warrant a separate application in its own right. In order to reduce complexity and also to make the application easier to use in other settings, the application should be able to render markup and perform updates independently of other applications while still being able to make use of information explicitly provided by other applications. To guide the user through a complex task, the application requires the ability to store state information.

A portlet is a web application that fulfills these requirements.

A portal system aggregates content rendered by multiple portlets to create a complete web page. When this happens, additional requirements come into play. The portlets should be able to operate independently of one another. For example, when the user information is updated, the order information should not be lost or change in an unplanned manner. A user should be able to set a bookmark on a portal page in order to return to a particular overall view. And browser back button support should work in an intuitive manner.

The portlet programming model allows a portal system to fulfill these requirements.

Web pages often incorporate JavaScript code to provide a responsive user experience. When a change is made, the JavaScript code only updates that portion of the web page actually requiring a change. When this principle is applied to a portal system, it means on one hand that a portlet needs to be able to provide JavaScript code that can update its own markup.

But portlets can share information among themselves, so that an update to one portlet can affect the state and rendered markup of another portlet. This means on the other hand that the JavaScript code provided by a given portlet also needs to be activated when it is affected by a change initiated by a different portlet. The portlet programming interface provides a mechanism that takes these requirements into account.

The portlet programming interface described by this specification provides the means to create independent portlet applications that a portal system can integrate with other portlet applications to create a complete complex web page. It provides the following services:

- It allows the portlet to render markup fragments that a portal can combine with others to form a complete web page.
- It allows the portlet to update its own information without affecting other portlets on the page.
- It allows portlets to share information with other portlets in a defined, standardized manner.
- It allows the portlet to store its current state in order to maintain a specific data display.

- It allows the portlet to use JavaScript to provide a responsive user experience.

3.2 Portal Pages

A portlet generates markup fragments. A portal may add a title, control buttons and other decorations to the markup fragment generated by the portlet. This new fragment is called a portlet window. Then the portal may aggregate portlet windows into a complete document representing the portal page.

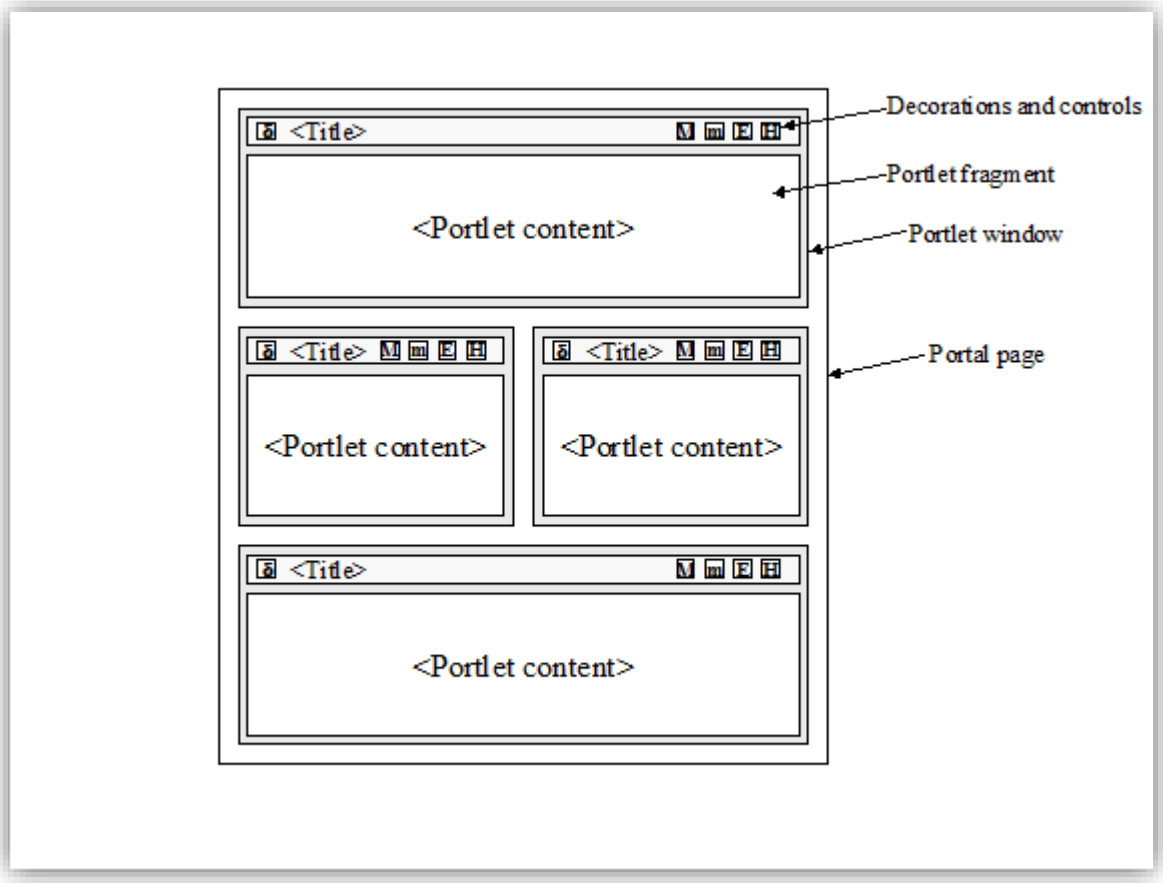


Figure 3–1 Elements of a Portal Page

Note that this is only one example on how a portal could make use of the portlet markup fragment. Portal implementations with a different rendering approach are possible. The important part of the portal page concept in regards to this specification is that the markup fragment generated by the portlet will in general not be the only document markup returned to the client. Thus the portlet markup needs to co-exist with whatever other markup the portal produces.

3.3 The Portlet Container

Page rendering begins when a client device or user agent, such as a web browser or web-enabled phone, sends a request for a page to the portal. The portal accesses the portlet container in order to obtain the markup to be returned to the client.

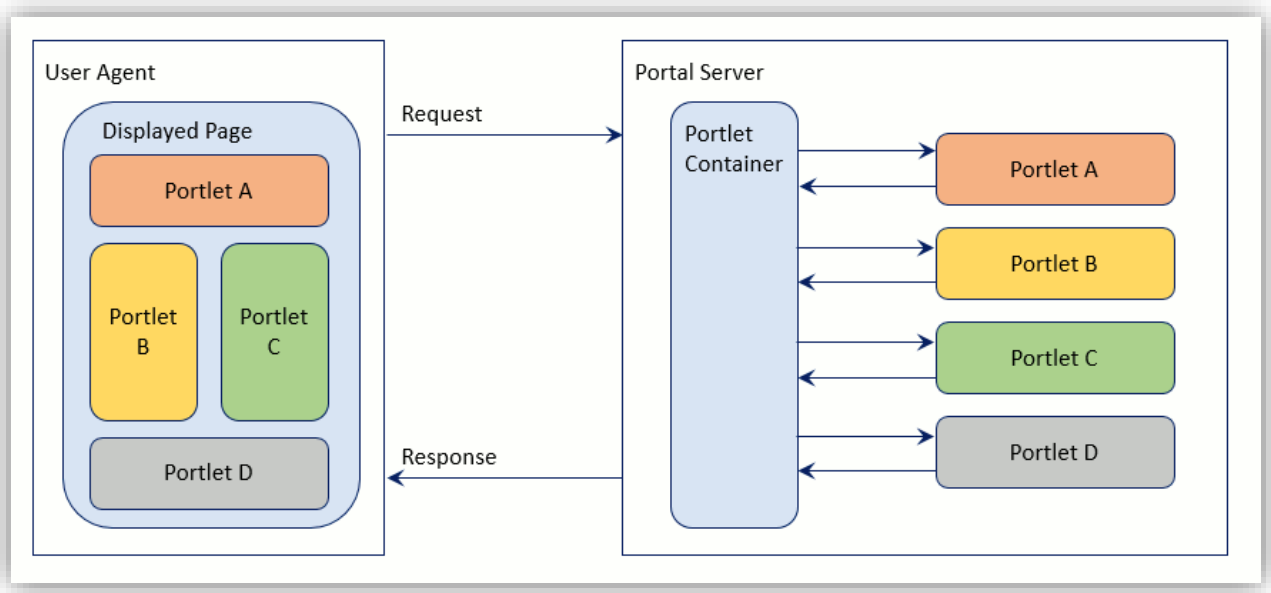


Figure 3–2 The Portlet Container

The portlet container implements the interfaces described by the Portlet Specification in order to provide the portlet with the requisite runtime environment, in the same manner that the servlet container implements the Servlet Specification in order to provide a servlet with the requisite runtime environment.

The Portlet Specification describes the programming interface and its semantics as seen by a portlet. It describes neither the portlet container implementation nor the interaction between a portal system and the portlet container. When discussing portal system or portlet container behavior from the point of view of the portlet, this document will refer to the portlet container as though it provides the complete functionality in question.

The portlet container calls the portlet code to execute the required function. It does so by issuing requests to the portlet. The requests are analogous to servlet requests, but have more specific meanings. There are five types of portlet request:

- Header request – generates markup for inclusion into the head section of a portal page and sets HTTP header information.
- Render request – generates markup fragments for inclusion into a portal page body section.
- Action request – performs processing that can cause a change to persistent data.
- Event request – processes an event that was fired by a portlet or by the portlet container. Can cause a change to persistent data.
- Resource request – generates additional data related to the current portlet state.

3.4 Typical Processing Sequence

The figure below illustrates a typical processing sequence. In this scenario, the user interacts with the user interface to trigger an action, for example by submitting a form. The request is transported to the portal server, where the following takes place:

1. The portlet container routes an action request to portlet B.
2. Portlet B processes the action request, and while doing so, fires a portlet event.
3. The portal system determines that portlet A is a recipient of the event.
4. The portlet container routes an event request to portlet A, which processes it.
5. After the action and event requests have been processed, the portal system renders each of the portlets on the page to obtain markup.
6. The portal system aggregates all content into a single document representing the portal page and returns it to the client.

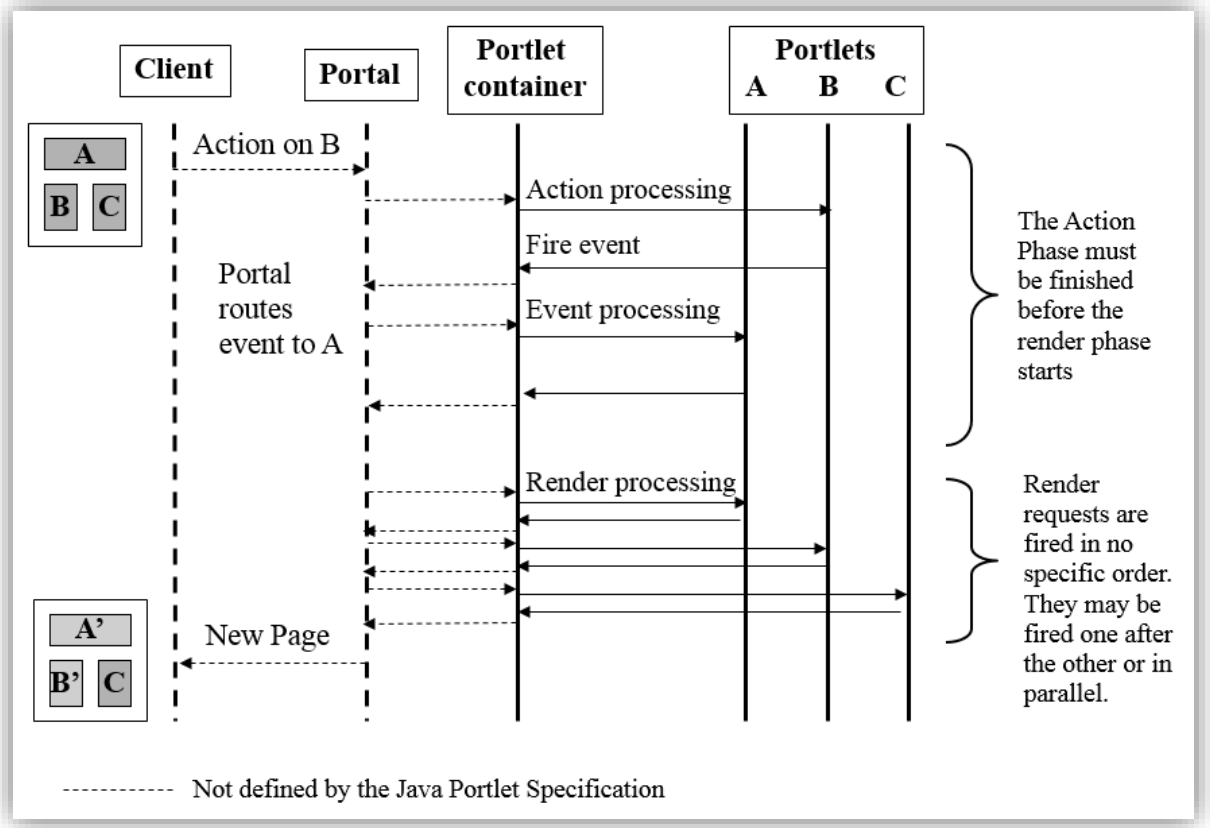


Figure 3–3 Typical processing sequence

3.5 Serving Resources

When portlets generate markup, they can add links to internal resources for retrieval by the browser.

The process of providing additional resources for inclusion into the portlet markup is known as resource serving, and such links are known as resource links or resource URLs. Portlets can create two different kinds of resource links in order to serve resources:

1. Direct links to the resource in the same portlet web application. The portlet constructs and encodes such links. They are not guaranteed to pass through the portal server and do not initiate portlet processing. They should be used in cases where the access to the portlet context and access through the portal is not needed, for example when serving a static resource such as an image. The portlet should use these links whenever possible.
2. Resource URL links that address the portlet. The portlet generates such links using methods defined by the Portlet Specification. In this case, activating the resource URL link causes a resource request to be routed to the target portlet. Since the portal handles the request triggered by the resource URL, it can impose user-specific security constraints on the request as it can for any other portlet request.

   The portlet can use its portlet context and other resources to generate the appropriate data. During resource request processing, the portlet is not limited to generating markup, but has complete control of the response, and can send any appropriate data back to the client – HTML markup, JSON data, binary data, or whatever.

The figure below shows the resource processing sequence.

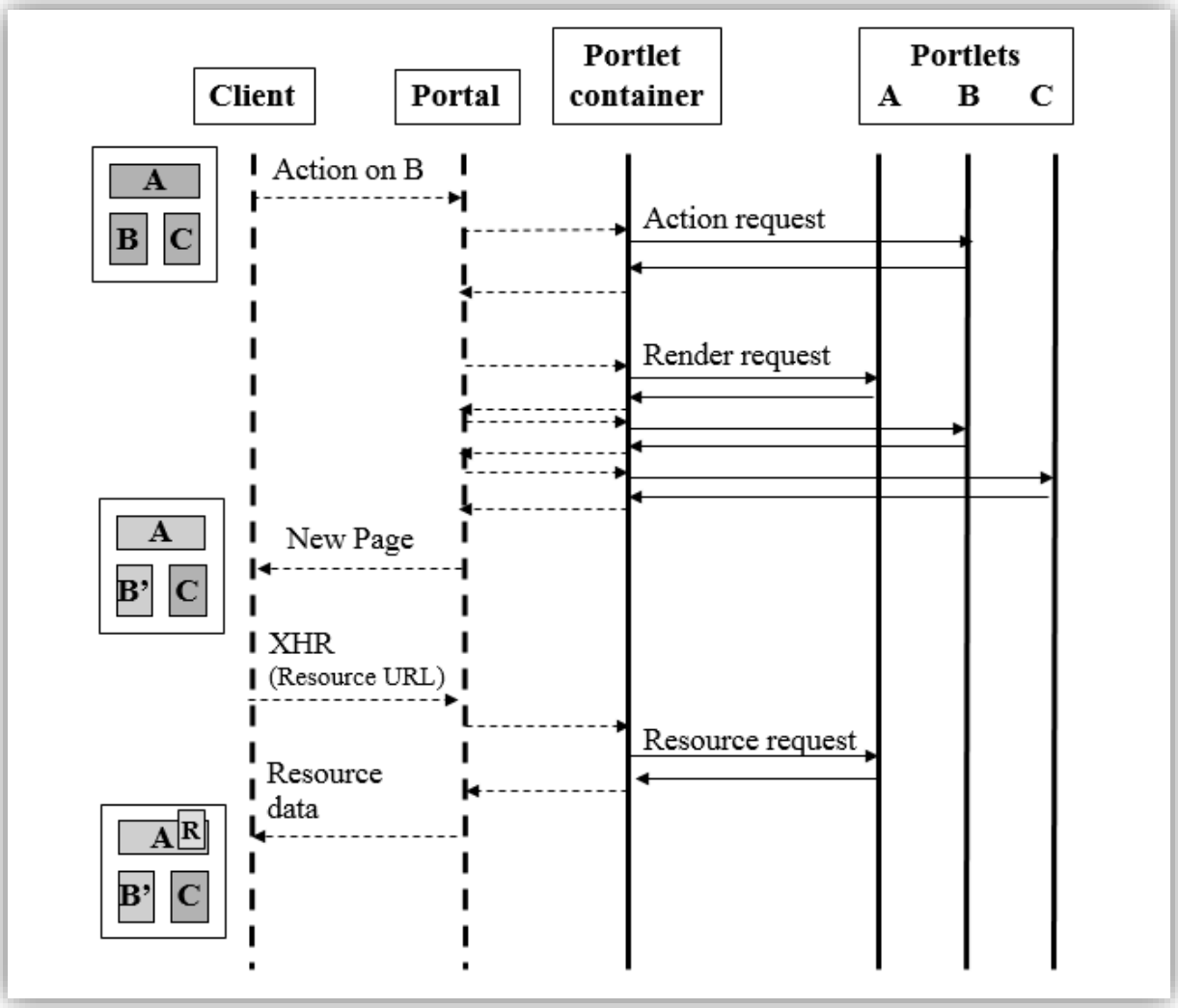


Figure 3–4 Resource Processing Sequence

The top part of the picture shows a normal action request that results in a complete page rendering. The resource serving sequence is executed as follows:

1. A resource URL for portlet A is triggered, resulting in an asynchronous `XMLHttpRequest` to the portal.
2. The portlet container invokes a resource request for portlet A.
3. Portlet A generates response data and returns it to the portlet container.
4. The portal returns the markup to the browser client
5. JavaScript code running on the client updates the user interface accordingly, for example by updating the browser DOM.

3.6 Execution Stages and Phases

The portlet container must enforce an execution stage model to control portlet request invocation. Conceptually, a portlet execution stage is triggered by activation of a portlet URL. A portlet execution stage consists of one or more portlet request processing phases.

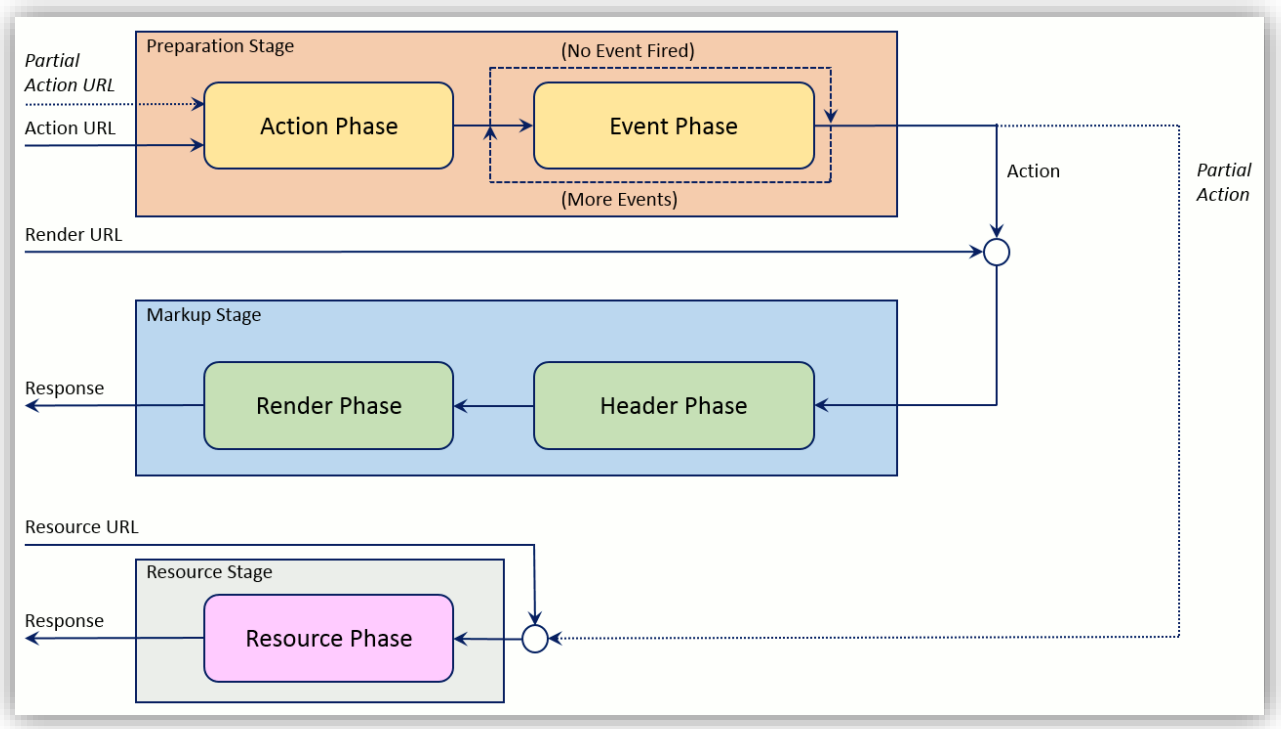


Figure 3–5 The Portlet Phase Model

3.6.1 The Preparation Stage

The purpose of the preparation stage is to allow the portlet to make changes to the current portlet state as well as to the backend state.

The preparation stage is triggered through use of either an action URL or a partial action URL. In either case, preparation stage processing is the same. Commonly, the client will use the HTTP POST method to initiate preparation stage execution.

To begin the preparation stage, the portlet container invokes the action phase for the target portlet. During action phase processing, the portlet may fire one or more events.

If the action target portlet fires an event, the portlet container invokes the event phase for each recipient portlet. For a given event, there may be zero or more event recipient portlets. The portlet firing the event may also receive the same event.

A portlet may fire additional events during event request processing. If it does so, the portlet container will dispatch the events to recipient portlets as previously described.

At the end of the preparation stage, the portlet will have prepared the portlet state and backend state for execution of the markup stage. If events were dispatched, the event recipient portlets as well as the action target portlet may have updated their portlet state and backend state.

Once the portlet state is set during preparation stage execution, it remains in force until it is explicitly changed through activation of a render URL containing new portlet state data or until it is explicitly changed through a subsequent preparation stage execution.

The portlet state of portlets that are neither the action target portlet nor an event recipient portlet remains unchanged except for public render parameters modified during the preparation stage.

If the preparation stage was initiated through an action URL, the portlet container can either continue directly with markup stage execution, or may redirect the client to a render URL containing the portlet state information in order to implement a POST-redirect-GET paradigm. Which of the methods is used is left as a portlet container implementation detail.

If the preparation stage was initiated through a partial action URL, the portlet container must execute the resource stage for the action target portlet rather than continuing with the markup stage. The portlet container will use the portlet state set during the preparation stage to execute the resource stage.[2]

3.6.2 The Markup Stage

The purpose of the markup stage is to produce markup that is aggregated into a complete portal page and returned to the client.

Conceptually, the markup stage is always initiated through a render URL containing the portlet state of all of the portlets on the page to be rendered. The render URL can be generated by a preceding preparation stage or can arrive at the portal through user interaction with a render URL link or through a page refresh.

Since the preparation stage does not change the portlet state of unaffected portlets, a portlet may be rendered multiple times for a given portlet state.

The portlet container will execute the markup stage for each portlet on the page being rendered.

The markup stage consists of two portlet request processing phases, the header phase and the render phase, that are executed in sequence.

The portlet container invokes the header phase to allow the portlet to generate HTTP header and HTML document head section data. After the header phase completes, the portlet container invokes the portlet render phase to allow the portlet to generate markup for the document body.

The portlet container must perform header phase processing for all portlets on the page before the overall portal response is committed. This can mean that the header phase invocations for all portlets on the page are completed before the render phase invocations begin.

3.6.3 The Resource Stage

The purpose of the resource stage is to produce data for inclusion into a portal page that was generated during a preceding markup stage.

[2] Partial action processing is part of the portlet client-side support and is described in more detail in Section 22.3.5 Partial Action.

The resource stage is invoked when a resource URL is activated. This typically happens when user interaction causes JavaScript code executing on the browser to request resource data through use of a resource URL link.

The portlet container invokes the resource phase for the target portlet so that the portlet can produce the necessary response data.

The portlet has complete control over the response data produced during the resource phase. The portal application must not render any output in addition to the content returned by the resource request, although it may set additional HTTP response headers. The portal application should act only as a proxy for accessing the resource.

The resource stage can be viewed as a logical extension of the markup stage, since the portlet state contained in the resource URL is fixed to be the same portlet state that governed the markup stage during which the resource URL was created.

3.7 *Portlet Request Processing Phases*

The portlet request processing action, event, header, render, and resource phases were introduced in the preceding section. The portlet container will generally invoke one or more portlet request execution methods during each request processing phase.

When executing a portlet request processing phase, the portlet container creates a portlet request and a portlet response object for use by the portlet. The portlet request and response objects are analogous to the servlet request and response objects. Since different portlet requests require different data and capabilities, the Portlet Specification defines appropriate request and response objects for each portlet request processing phase.

After creating the request and response objects, the portlet container then invokes the appropriate portlet request execution method or methods.

3.7.1 Render Phase

When the portal is rendering a page, it invokes the portlet container. The portlet container in turn executes the render phase for each portlet on the page by creating the render request and response objects and invoking the appropriate portlet render method or methods. The portlet generates the appropriate markup based on the portlet state reflected in the render request and returns it to the portlet container through the render response. The generated markup type must be compatible with the markup type generated by the portal. The portlet container returns the markup to the portal for aggregation into the portal page.

The portlet cannot change the portlet state during the render phase.

When the portal has received markup from all portlets on the page, it writes aggregated page as response data for transmission to the client.

Note that the portal is not required to wait until it has obtained markup from all portlets on the page before returning markup to the client. It can instead stream content to the client as it is obtained from each portlet. The exact manner in which the portal provides markup to the client is left to the portal implementation.

3.7.2 Header Phase

The portlet container executes the header phase by creating the header request and response objects and invoking the appropriate portlet render header method or methods. The portlet container must execute the header phase during page rendering, but before the portal

application has written any response data for transmission to the client. The portlet may set cookies or other HTTP header information and may generate markup for inclusion into the head section of the overall portal response document returned to the client.

The portlet cannot change the portlet state during the header phase.

3.7.3 Action Phase

When the user interacts with portlet markup displayed by a user agent so as to cause an update to information stored on the server, a portlet action is initiated. Typically this happens when the user submits a form that the portlet rendered as part of its markup.

The portal routes the submitted form to the portlet that generated the form markup. The portal recognizes the appropriate portlet through information encoded into the URL used for the form submission.

The portal passes the form to the portlet container, which then executes the action phase by creating the action request and response objects and invoking the appropriate portlet action method.

During action phase processing, the portlet does not generate markup to be returned to the client. Instead, the portlet updates its portlet state information and potentially also data stored on the server or on a backend system so that the appropriate markup can be generated during subsequent render request processing.

In the simplest case, after the portlet completes action phase processing, the portlet container invokes the render phase for each portlet on the page as described in a preceding section. During the rendering, the action request target portlet may have updated its portlet state, but the remaining portlets on the page will be rendered with the same private portlet state information as before.

3.7.4 Event Phase

The portlet event mechanism provides a way for portlets to communicate with one another.

Event phase processing can be initiated either by a portlet or by the portlet container. The portlet can initiate event phase processing by firing one or more portlet events during action phase execution. Also, the portlet container may fire implementation-specific events targeted to a portlet. Such events may be triggered by a portal URL or through an implementation-specific mechanism.

Regardless of how the event phase is initiated, the portlet container can route the events to portlets able to receive them. The algorithm used for event routing is not defined in the Portlet Specification and is implementation specific.

When the portlet container routes an event to a recipient portlet, it invokes the portlet event phase by creating the event request and response objects and invoking the appropriate portlet event method. During event phase processing, the portlet does not generate markup to be returned to the client. Instead, the portlet updates its portlet state information and potentially also data stored on the server or on a backend system so that the appropriate markup can be generated during subsequent render request processing.

The portlet may also fire additional events during the event phase.

3.7.5 Resource Phase

The resource phase differs from the remaining portlet request execution phases in that it is not strictly bound to the portal page rendering sequence.

When the client activates a resource URL, the portal invokes the portlet container for the target portlet. The portlet container invokes the portlet resource phase by creating the resource request and response objects and invoking the appropriate portlet resource method or methods. The portlet generates a response for the client based on the portlet state and any additional resource parameters.

Typically the resource URL is activated through use of JavaScript code. The JavaScript code triggering the resource URL receives the resource response and adds the information to the portal page in the appropriate manner.

Unlike render phase processing, where the generated markup type must match the markup type generated by the portal, during the resource phase, the portlet has complete control over the generated response. The portlet can return HTML markup, plain text, JSON data, image data, or other data as appropriate.

The portlet cannot change the portlet state during the resource phase.

3.8 Portlet URLs

The portlet can use the Portlet API to generate URLs for inclusion into portlet markup. There are four types of portlet URL:

- The render URL initiates markup stage processing.
- The action URL initiates preparation stage processing
- The partial action URL initiates preparation stage processing.
- The resource URL initiates a resource stage processing.

All types of portlet URL can contain portlet state information. When a portlet URL is activated, the portlet state specified by the URL is made available to the portlet when the corresponding portlet request phase is invoked.

The Java classes that represent the render URL and action URL artifacts provide methods for modifying the portlet state. Any portlet state information attached to a resource URL cannot be modified.

The action URL can contain additional action parameters. The portlet can use portlet API methods to set action parameters. Also, parameters resulting from HTML form submission are also provided through the action parameters.

The client-side portlet API allows for creation of a partial action URL in order to support action-oriented frameworks. The portlet client-side code can specify additional action parameters for inclusion on the partial action URL. The portlet state information cannot be modified. Parameters resulting from HTML form submission are also provided through the action parameters on the partial action URL.

The resource URL is bound to the portlet state governing the portlet request processing phase during which the resource URL is created. The portlet can use portlet API methods to set the cacheability option for the resource URL. The resource URL will contain the portlet state depending on the cacheability setting. The resource URL can contain additional resource parameters. The portlet can use portlet API methods to set resource parameters.

The actual content and structure of the portlet URL is left as an implementation detail of the portal implementation and is not described further in this specification.

3.9 Portlet Parameters and Portlet State

3.9.1 Portlet Parameters

Portlet parameters are name value pairs modeled after servlet request parameters. The parameter name is represented by a string while the value is a string array. The Portlet Specification discerns between several types of parameters depending on how they are used.

Render parameters govern how the portlet is to generate data for aggregation into a portal page. The portlet can set render parameters during action phase processing to govern the following render and resource phases.

During render and resource phase execution, the portlet can generate render and action URLs and set render parameters on them. When the URL is activated, the portlet container uses the render parameters set on the URL to govern resulting render or action phase execution.

Action parameters are attached to an action or partial action URL and are independent from the render parameters. The portlet can set action parameters on the URL explicitly, or the action parameters can be set implicitly as a result of a form submission.

During action phase processing, the portlet container provides the action parameters to the portlet separately from the render parameters.

Resource parameters are portlet parameters independent from render parameters that can be attached to a resource URL. Resource parameters must be explicitly attached to a resource URL.

During resource phase processing, the portlet container provides the resource parameters to the portlet separately from the render parameters.

3.9.1.1 Public Render Parameters

Render parameters as described above are private to the portlet. The portlet container must not allow other portlets to read or modify private render parameters.

The portlet configuration contains fields that allow specific render parameters to be declared as public. A public render parameter can be read and modified by any portlet that declares that specific parameter to be public. See Section 12.2.1 Public Render Parameters for further information.

3.9.2 The Window State

The window state is an indicator of the amount of page space the portlet is allowed to use on the portal page. The portlet container provides the window state to the portlet during the render and resource phases so that the portlet can adapt its display appropriately.

3.9.3 The Portlet Mode

The portlet mode indicates the function that the portlet is to perform during rendering. For example, during ‘VIEW’ mode, the portlet should render its usual content for display, while during ‘HELP’ mode, the portlet should display information about how to use the portlet. The portlet container provides the portlet mode to the portlet during the render and resource phases so that the portlet can adapt its display appropriately.

3.9.4 The Portlet State

The portlet state consists of the render parameters, the portlet mode, and the window state. The render parameters in the portlet state can be either public or private. The portlet state information is provided to the portlet in each request.

Conceptually, the portlet state is stored on the URL used to access the portal because the URL designates the page to be rendered or the operation to be performed. The portlet container must provide the portlet state indicated by the URL to the portlet during every portlet request. However, a portal implementation may choose to actually store the information in a location other than the URL.

3.10 Portlet Stage Execution

If the client request is triggered by an action URL, the portlet container must first trigger preparation stage execution for the target portlet. After the preparation stage completes, the portlet container must trigger the markup stage for all the portlets on the portal page with the possible exception of portlets for which content is being cached. The header phase for each of the portlets may be executed sequentially or in parallel without any guaranteed order, but the header phases for all of the portlets must be complete before the portal begins writing the aggregated response data. The render phase for each of the portlets may be executed sequentially or in parallel without any guaranteed order.

If the client request is triggered by a partial action URL, the portlet container must first trigger preparation stage execution for the target portlet, executing both the action phase and any resulting event phase for all affected portlets. After the preparation stage completes, the portlet container must execute the resource stage for the partial action target portlet and return any resulting markup in the portal response.

If the client request is triggered by a render URL, the portlet container must execute the markup phase for all the portlets on the portal page with the possible exception of portlets for which content is being cached. The header phase for each of the portlets may be executed sequentially or in parallel without any guaranteed order, but the header phases for all of the portlets must be complete before the portal begins writing the aggregated response data. The render phase for each of the portlets may be executed sequentially or in parallel without any guaranteed order.

If the client request is triggered by a resource URL, the portal/portlet container must execute the render stage of the target portlet unless a valid cache entry is available.

If a portlet has caching enabled, the portlet container may choose not to invoke the markup or resource stages for that portlet. The portal/portlet container may instead use the portlet's cached content. Refer to Chapter 23 Caching for details on caching.

3.11 Client-Side Support

Use of JavaScript code on the client to improve the end-user experience has become very prevalent. Portlet Specification 2.0 introduced resource serving to allow portlets to access resources according to the Ajax paradigm. Portlet Specification 3.0 improves client-side support for portlets by introducing a dedicated client-side JavaScript API for portlet support.

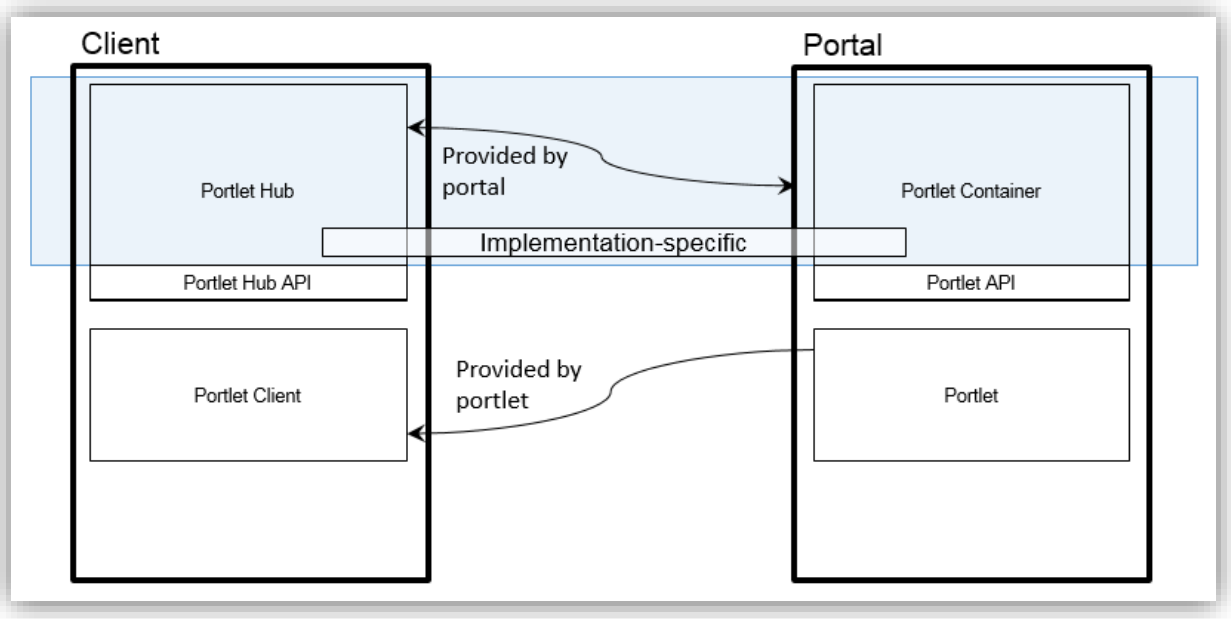


Figure 3–6 Client Side Support

The client-side portlet API is known as the portlet hub. Portlet Specification 3.0 defines the API and its semantics, but does not define its implementation details. The portlet hub implementation along with any necessary communication protocols between the portlet hub and the portal server are implementation-specific and are not covered by this specification.

The portlet hub is a JavaScript module provided by the portal implementation that manages the state for all portlets on the page.

A portlet can provide JavaScript code known as the portlet client that registers itself with the portlet hub. Once registered, the portlet hub informs the portlet client through a callback function whenever the portlet state for that portlet changes. The portlet client can use portlet hub methods to set the portlet state, to execute portlet actions, and to obtain resource URLs that correspond to the current page state.

Refer to Chapter 22 Client-Side Support for additional details.

3.12 Portlet Lifecycle Methods

The portlet container calls portlet lifecycle methods under well-defined circumstances to perform portlet initialization, execute portlet requests, and to take a portlet out of service.

The portlet lifecycle methods can be identified through use of the `Portlet`, `EventPortlet`, `HeaderPortlet`, and `ResourceServingPortlet` interfaces or through use of annotations. This specification describes the portlet interfaces and associated artifacts beginning in *Chapter 4, Portlet Lifecycle Interfaces*. The concepts and artifacts introduced through these interfaces define and underlie portlet behavior.

Portlet Specification 3.0 provides a new capability of identifying portlet lifecycle methods through use of annotations. The Portlet Specification describes this capability in Section 4.8 Extended Annotation-Based Dispatching.

3.13 Portlets and Web Frameworks

The portlet model provides a clear separation of the state-changing logic that is embedded in the preparation stage and the rendering of markup which is performed during the markup and resource stages. The portlet model thus follows the popular Model-View-Controller pattern which separates the controller logic from the part that generates the view.

Portlets use JavaServer Pages (JSP) as the native technology for rendering views. However, the Portlet Specification accommodates use of other frameworks, notably JavaServer™ Faces (JSF™), as view technologies. When using such a web framework, the portlet acts as a bridge between the portlet environment and the web framework.

Chapter 4 Portlet Lifecycle Interfaces

The `Portlet` interface is the main abstraction of the Portlet API. All portlets implement this interface either directly, by extending a class that implements the interface, or indirectly through method identification by annotation.

The portlet can optionally implement the additional life cycle interfaces `EventPortlet`, `HeaderPortlet`, and `ResourceServingPortlet` in order to coordinate with other portlets through events, to set header information, or to serve resources, respectively.

The Portlet API includes a `GenericPortlet` class that implements the `Portlet`, `EventPortlet`, `HeaderPortlet`, and `ResourceServingPortlet` interfaces and provides default functionality. Developers can extend the `GenericPortlet` class to implement their portlets.

The Portlet API includes a mechanism for identifying portlet lifecycle methods through use of annotations. The portlet methods identified in this manner need not implement the portlet interfaces named above, but each portlet method annotation imposes method signature requirements that must be met.

4.1 Number of Portlet Instances

The portlet configuration along with the portlet method annotations defines the portlets available in the portlet application. Each portlet in the portlet application is uniquely identified by the portlet name.

The portlet container may instantiate only one portlet object per unique portlet definition per virtual machine (VM).

4.2 Portlet Life Cycle Methods

The portlet container manages the portlet through a well-defined lifecycle that defines how it is loaded, instantiated, initialized, handles requests from clients, and is taken out of service.

The `Portlet` interface `init` and `destroy` methods are used to initialize the portlet and take it out of service, respectively. The corresponding method annotations are `@PortletInit` and `@PortletDestroy`.

The request processing methods are the `Portlet` interface `processAction` and `render` methods, the `HeaderPortlet` interface `renderHeader` method, the `EventPortlet` interface `processEvent` method, and the `ResourceServingPortlet` interface `serveResource` method. The portlet lifecycle methods `init`, `destroy`, `processAction`, `render`, `processEvent`, `renderHeaders` and `serveResource` are implemented by a portlet class and are referred to as the portlet class lifecycle methods.

The corresponding portlet method annotations are `@ActionMethod`, `@RenderMethod`, `@HeaderMethod`, `@EventMethod`, and `@ServeResourceMethod`, respectively. The portlet lifecycle methods that are not implemented by a portlet class but are instead identified through these annotations are referred to as annotated portlet lifecycle methods.

The portlet method annotations named above may be in some cases be used to annotate methods defined through the portlet interfaces in order to contribute configuration data. However, their primary purpose is to identify portlet methods contained within managed beans, as will be discussed in Section 4.8 Extended Annotation-Based Dispatching on page 32.

Since the portlet lifecycle methods may be identified either through implementation of an interface or through application of an annotation, discussion in this chapter will refer to the lifecycle methods generically using the names init, destroy, action, event, render, header, and resource when it is not necessary to be more specific.

4.2.1 Loading and Instantiation

The portlet container is responsible for loading and instantiating portlets. The loading and instantiation can occur when the portlet container starts the portlet application, or can be delayed until the portlet container determines the portlet is needed to service a request.

The portlet container must load the portlet class using the same `ClassLoader` the servlet container uses for the web application part of the portlet application. After loading the portlet classes, the portlet container instantiates them for use.

See also Section 21.1 Portlet Instantiation on page 119 for information on portlet instantiation when a CDI container is present.

4.2.2 Initialization

After the portlet object is instantiated, the portlet container must initialize the portlet before invoking it to handle requests. Initialization is provided so that portlets can initialize costly resources (such as backend connections), and perform other one-time activities. The portlet container must initialize the portlet object by calling the init method with a unique (per portlet definition) object implementing the `PortletConfig` interface. This configuration object provides access to the initialization parameters and the `ResourceBundle` defined in the portlet configuration. Refer to Chapter 7 The PortletConfig Interface on page 48 for information about the `PortletConfig` interface. The configuration object also gives the portlet access to a context object that describes the portlet's runtime environment. Refer to Chapter 8 Portal Context on page 51 for information about the `PortletContext` interface.

4.2.2.1 Error Conditions on Initialization

During initialization, the portlet object may throw an `UnavailableException` or a `PortletException`. In this case, the portlet container must not place the portlet object into active service and must release the portlet object. The portlet container must not call the destroy method because the initialization is considered to have been unsuccessful.

The portlet container may reattempt to instantiate and initialize the portlets at any time after a failure. The exception to this rule is when an `UnavailableException` indicates a minimum time of unavailability. When this happens the portlet container must wait for the specified time to pass before creating and initializing a new portlet object.

The portlet container must handle a `RuntimeException` thrown during initialization as a `PortletException`.

4.2.2.2 Tools Considerations

The triggering of static initialization methods when a tool loads and introspects a portlet application is to be distinguished from initialization performed by calling the init method.

Developers should not assume that a portlet is in an active portlet container runtime until the init method is called. For example, a portlet should not try to establish connections to databases or Enterprise JavaBeans™ containers during static (class) initialization.

4.2.3 End of Service

The portlet container is not required to keep a portlet loaded for any particular period of time. A portlet object may be kept active in a portlet container for a period of milliseconds, for the lifetime of the portlet container (which could be a number of days, months, or years), or any amount of time in between.

When the portlet container determines that a portlet should be removed from service, it calls the destroy method to allow the portlet to release any resources it is using and to save any persistent state. For example, the portlet container may do this when it wants to conserve memory resources or when it is being shut down.

Before the portlet container calls the destroy method, it should allow any threads that are currently processing requests within the portlet object to complete execution. To avoid waiting forever, the portlet container can optionally wait for a container-defined time period before destroying the portlet object.

Once the destroy method is called on a portlet object, the portlet container must not route any requests to that portlet object. If the portlet container needs to enable the portlet again, it must do so with a new portlet object, which is a new instance of the portlet's class.

If the portlet object throws a `RuntimeException` within the execution of the destroy method the portlet container must consider the portlet object to be successfully destroyed.

After the destroy method completes, the portlet container must release the portlet object so that it is eligible for garbage collection. Portlet implementations should not use finalizers.

4.3 Portlet Customization Levels

The portlet model leverages the flyweight pattern and provides the portlet instance with all required request-specific data during each portlet request execution phase. This keeps the number of portlet instances small and thus allows better scalability for large user numbers. The portlet programming model allows for different levels of customization. In order to distinguish between the different levels of customization, this section introduces the terms portlet definition, portlet entity, and portlet window.

4.3.1 Portlet Definition and Portlet Entity

The portlet definition is a set of configuration properties that govern the behavior of the deployed portlet. The portlet definition is identified by the unique portlet name. Property values are provided through the portlet configuration (see Chapter 28 Configuration). The portlet definition may include default values for the portlet preferences, which are name-value pairs with portlet-specific meaning (see Chapter 19 Portlet Preferences).

The portlet entity is a portlet instance associated with a set of portlet preferences. A given portlet instance may be associated with multiple distinct sets of portlet preferences, resulting in multiple portlet entities for that portlet instance. The portlet container manages the unique portlet entities in an implementation-specific manner.

The portlet preferences customize portlet behavior and influence the content the portlet produces. The portlet may read, modify and add preferences.

The portal builds an initial set of portlet preferences based on the values from the portlet definition. A portal may provide means to create new sets of portlet preferences or to modify existing ones. Administration, management, and configuration of portlet preferences along with definition of advanced customization features, such as hierarchical management of portlet preferences or cascading changes to portlet preferences, is left to the portal implementation.

4.3.2 Portlet Window

A portlet window is a portlet entity uniquely located on a portal page. A given portlet entity may appear on multiple portal pages or multiple times on the same page, resulting in the portlet entity appearing in multiple portlet windows.

The portlet container assigns a unique ID to each portlet window. The ID is constant, valid for the lifetime of the portlet window, and is used by the portlet container to key the portlet-scoped session data. The portlet can access the portlet window ID using the `PortletRequest.getWindowID` method.

A portal may manage the portlet preferences associated with a given portlet window in an implementation-specific hierarchical manner, but during portlet method execution, the portlet container must provide an aggregated set of portlet preferences to the portlet.

From a developer's perspective, portlet windows are important because they define distinct runtime views. The portlet container maintains the portlet state and the portlet-scoped session state based on the portlet window. Hence the same portlet entity appearing in different portlet windows may be associated with different portlet state and portlet session-scoped data.

4.4 Portlet Class

With the introduction of the portlet method annotations listed in Section 4.2, it is no longer strictly necessary to identify a portlet class. The annotated portlet lifecycle methods may reside in any valid managed bean class. It is possible to write a portlet using only such annotated methods.

However, if the developer implements a portlet by extending the `GenericPortlet` class or by implementing the portlet lifecycle interfaces directly without using the portlet method annotations, the portlet class must be identified to allow the portlet container to perform dispatching.

The portlet container must recognize a class as being a portlet class if it implements, directly or indirectly, the `Portlet` interface and is also identified as the portlet class associated with a portlet name in the portlet configuration. The portlet class may optionally implement the remaining portlet lifecycle interfaces `HeaderPortlet`, `EventPortlet`, and `ResourceServingPortlet`.

The developer can identify the portlet class in the configuration either by applying the `@PortletConfiguration` annotation to a class that implements the `Portlet` interface, or by naming the class in the portlet deployment descriptor using the `<portlet-class>` element. See Section 28.2.4 Portlet Identification on page 183 for further information.

4.5 Example Request Sequence

The following figure shows an example request processing sequence.

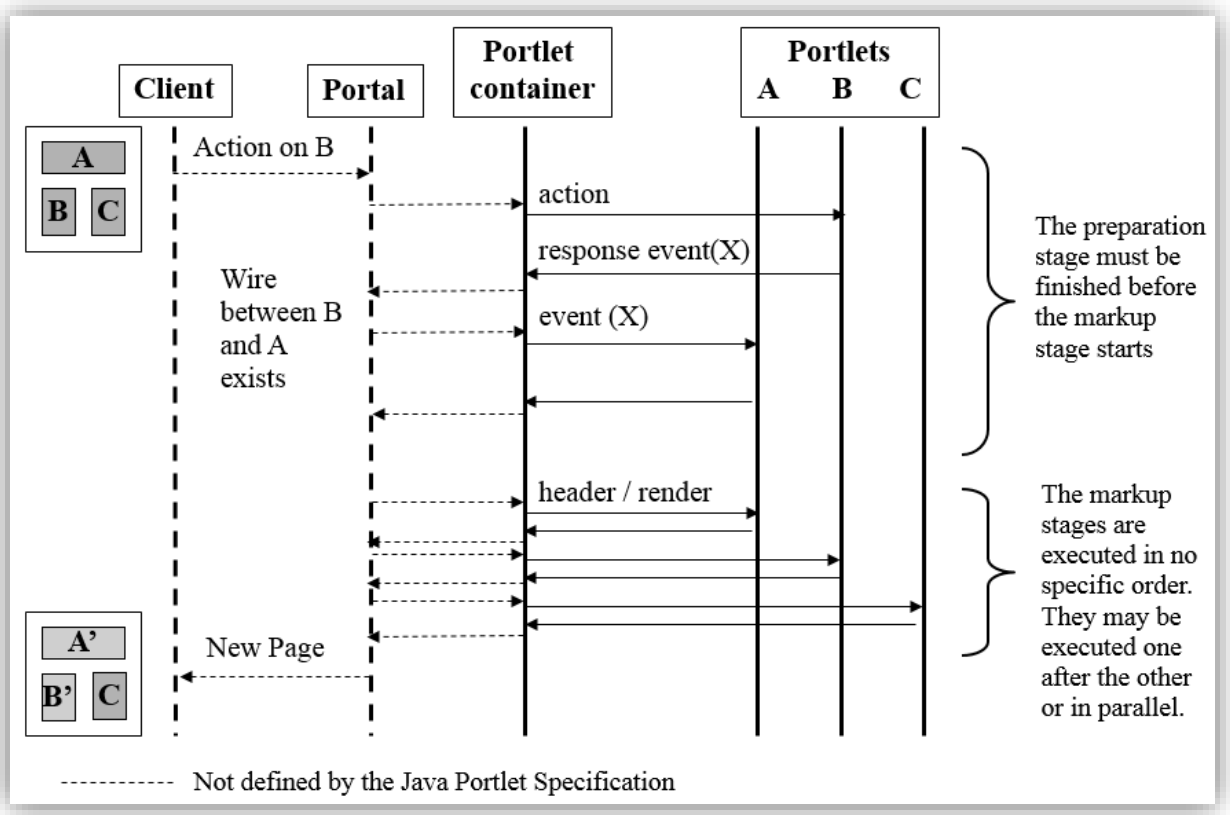


Figure 4–1 Example Request Sequence

An action initiated by the client through interaction with portlet B results in preparation stage execution and an action method call to portlet B. During action phase processing, portlet B updates its portlet state appropriately and publishes an event. The portlet container routes the event to portlet A by calling its event method. Portlet B updates its portlet state and returns.

Finally, the portlet container executes the markup stage for each of the portlets. Although the diagram shows markup stage execution for each portlet as being sequential, the Portlet Specification places no such requirement. The markup stages for each portlet can be invoked in any order or even in parallel as long as the portlet container assures that the header phase for each portlet is executed before the overall portal response has been committed.

The portlet container could also split up the markup stages for each portlet so as to execute the header phase for each of the portlets before the overall portal response has been committed while executing the render phase for each portlet after the portal has begun streaming overall portal response data to the client.

4.6 Request Handling

After a portlet object is properly initialized, the portlet container may invoke the portlet to handle client requests. The portlet container invokes the portlet request methods in the context of the corresponding portlet request processing phase, see Section 3.7 Portlet Request Processing Phases on page 14. The portlet container executes the portlet request processing

phase according to a fixed logical portlet request processing sequence (the actual implementation may differ, but the principle must remain the same).

1. The portlet container prepares the portlet request and response objects for the portlet request processing phase. These objects govern execution of the entire portlet request processing phase even when the portlet container invokes more than one portlet request method during that phase. The table below summarizes the request and response objects for each portlet request processing phase, indicates whether multiple method invocations are allowed, and identifies the corresponding portlet interface lifecycle method.

Phase	Request Object	Response Object	Multiple Methods Allowed	Lifecycle Interface Method
Action	`ActionRequest`	`ActionResponse`	No	processAction
Event	`EventRequest`	`EventResponse`	No	processEvent
Header	`HeaderRequest`	`HeaderResponse`	Yes	renderHeaders
Render	`RenderRequest`	`RenderResponse`	Yes	render
Resource	`ResourceRequest`	`ResourceResponse`	Yes	serveResource

2. The portlet container makes portlet artifacts available for injection, see Section 21.3 Portlet Predefined Beans on page 120.
3. The portlet container invokes any configured portlet filters for the request, see Chapter 17 Portlet Filters on page 100.
4. The portlet container determines the portlet methods to be invoked.

   If the portlet uses annotated portlet lifecycle methods, there may be multiple methods for invocation, as will be discussed shortly. Otherwise, only the corresponding portlet class lifecycle method will be invoked.
5. If annotated portlet lifecycle methods are present, the portlet container invokes them according to the rules defined in Section 4.8 Extended Annotation-Based Dispatching on page 32.
6. Otherwise, if the portlet class method corresponding to the execution phase is present, that method is invoked.
7. If no portlet class method can be found for the execution phase, the portlet container should recognize the error and handle it in an appropriate manner.

   This can occur, for example, if a portlet that does not implement the `ResourceServingPortlet` interface renders a link using a resource URL and that link is activated.

4.6.1 Action Lifecycle Method

During action phase processing, a portlet can update the portlet state based on the information provided through the action request parameters.

The action method can access the the `ActionRequest` and the `ActionResponse` objects.

The `ActionRequest` object provides access to information such as the portlet state, the action parameters, the portal context, the portlet session, and the portlet preferences data.

While executing the action method, the portlet may instruct the portlet container to redirect the user to a specific URL. If the portlet issues a redirection, when the action method concludes, the portlet container must send the redirection back to the user agent and abort the preparation stage processing without executing the event phase for any portlet.

A portlet may change its portlet state consisting of portlet mode, window state, and render parameters during an action request using the `ActionResponse` object.

The change of portlet mode must be effective for subsequent portlet request execution phases. There are some exceptional circumstances, such as changes of access control privileges that could prevent the portlet mode change from happening.

The change of window state should be effective for subsequent portlet request execution phases. The portlet should not assume that the subsequent request will be in the window state set as the portlet container can override the window state due to implementation dependencies between portlet modes and window states.

The portlet may delegate the action processing to a servlet via a request dispatcher call (see Chapter 25 Dispatching to JSPs and Servlets).

The portlet may publish events using the `ActionResponse.setEvent` method and thus publish notifications to other portlets. See Chapter 18 Coordination between Portlets for more details on sending and receiving events.

4.6.2 Event Lifecycle Method

Events can be used to coordinate state between different portlets. The event method can access the `EventRequest` and the `EventResponse` objects.

The `EventRequest` object provides access to information such as the event payload, the portlet state, the portal context, the portlet session, and the portlet preferences data.

A portlet may change its portlet state consisting of portlet mode, window state, and render parameters during an event request using the `EventResponse` object.

The change of portlet mode must be effective for subsequent portlet request execution phases. There are some exceptional circumstances, such as changes of access control privileges that could prevent the portlet mode change from happening.

The change of window state should be effective for subsequent portlet request execution phases. The portlet should not assume that the subsequent request will be in the window state set as the portlet container can override the window state due to implementation dependencies between portlet modes and window states.

The portlet may delegate the event processing to a servlet via a request dispatcher call (see Chapter 25 Dispatching to JSPs and Servlets).

The portlet may publish events via the `EventResponse.setEvent` method and thus publish state changes or other notifications to other portlets. See Chapter 18 Coordination between Portlets for more details on sending and receiving events.

4.6.3 Header Lifecycle Method

The header method may access the `HeaderRequest` and `HeaderResponse` objects.

The `HeaderRequest` object provides access to information such as the portlet state, the portal context, the portlet session, and the portlet preferences data.

The portlet can set properties on the `HeaderResponse` object that cause the portal application to set corresponding HTTP header values on the overall portal response.

The portlet can produce content for the portal page document `HEAD` section using the `PrintWriter` object obtained from the `RenderResponse` or it may delegate the generation of content to a servlet or a JSP. Refer to Chapter 25 Dispatching to JSPs and Servlets for details.

The portlet should produce content such as `<style>` and `<meta>` tags that are valid for the `HEAD` section. The portlet container may filter or restrict `HEAD` section content. For example, the portlet container may disallow the `<title>` tag, as it could conflict with portal markup.

The portlet may not update the portlet state and should not trigger any backend state changes during header method execution. The header method invocation should be a safe operation as defined by the HTTP specification[3].

4.6.4 Render Lifecycle Method

Generally portlets generate content based on the current portlet state during render request execution. The render method may access the `RenderRequest` and `RenderResponse` objects.

The `RenderRequest` object provides access to information such as the portlet state, the portal context, the portlet session, and the portlet preferences data.

The portlet can produce content for the portal page document `BODY` section using the `PrintWriter` object obtained from the `RenderResponse` or it may delegate the generation of content to a servlet or a JSP. Refer to Chapter 25 Dispatching to JSPs and Servlets for details on this.

The portlet may not update the portlet state and should not trigger any backend state changes during render method execution. The render method invocation should be a safe operation as defined by the HTTP specification[3].

4.6.5 Resource Lifecycle Method

The resource method may access the `ResourceRequest` and `ResourceResponse` objects.

The `ResourceRequest` object provides access to information such as the portlet state, the portal context, the portlet session, the resource parameters, and the portlet preferences data.

The portlet can produce content using the `ResourceResponse` writer or output stream, or it may delegate the generation of content to a servlet or a JSP. Refer to Chapter 25 Dispatching to JSPs and Servlets for details on this.

The resource phase is logically tied to the preceding render phase through the portlet state. The portlet may not change the portlet state during resource phase processing. However, the portlet may make changes to information stored in the portlet session or stored as portlet preferences.

If the resource phase was initiated through the HTTP GET method, the portlet should not change any information stored as portlet preferences or stored in the portlet session.

If changes to such information is required, the resource phase should be initiated using a HTTP POST, PUT, or DELETE method when triggering the resource URL. The portlet should not change information that is shared with other portlets, such as portlet session scoped data or

[3] See RFC 2616, http://www.w3.org/Protocols/rfc2616/rfc2616.html

portlet preferences. Otherwise other portlets using the shared information could display stale markup. The portlet should note that such state changes impact cacheability of the resource and set the cacheability settings accordingly. See Section 14.2 The Resource URL for detailed discussion about cacheability.

Due to the potential for causing unintended side effects, updating information in the resource phase is generally discouraged.

4.6.6 Multithreading Issues During Request Handling

The portlet container handles concurrent requests to the same portlet by concurrent execution of the request handling methods on different threads. Portlet developers must design their portlets to handle concurrent multithread execution of the action, event, header, render, and resource lifecycle methods.

4.6.7 Exceptions During Request Handling

A portlet may throw a `PortletException`, a `PortletSecurityException`, or a `UnavailableException` during portlet request phase processing.

A `PortletException` signals that an error has occurred during portlet request phase processing and that the portlet container should take appropriate measures to clean up.

If a portlet throws an exception during action phase processing, the portlet container must ignore all operations on the `ActionResponse` including any events that were set.

If a portlet throws an exception during event phase processing, the portlet container must ignore all operations on the `EventResponse` including events that were set. Operations performed during the originating action request processing or during separate, successful event request processing cycles for the current or other portlets must remain unaffected. After the exception has been handled, the portlet container should continue processing other portlets on the portal page.

If a portlet throws an exception during render phase processing, any headers set and any data written by the portlet to the response that has not yet been flushed to the portal application should be cleared (see Section 16.5.3 Buffering on page 95 for a discussion on buffer handling). Data written by the portal itself or by other portlets as part of the overall client response must not be affected. The portlet container should continue processing other portlets on the portal page.

If a portlet throws an exception during resource request processing, any headers set and any data written by the portlet to the response that has not yet been flushed to the portal application should be cleared. The portlet container should respond to the client request with an appropriate HTTP status code.

A `PortletSecurityException` indicates that the request has been aborted because the user does not have sufficient rights. Upon receiving a `PortletSecurityException`, the portlet container should handle this exception in an appropriate manner.

An `UnavailableException` signals that the portlet is unable to handle requests either temporarily or permanently.

If the `UnavailableException` indicates permanent unavailability, the portlet container must remove the portlet from service immediately, call the portlet's destroy method, and release the portlet object. A portlet that throws a permanent `UnavailableException` must be considered unavailable until the portlet application containing the portlet is restarted.

When the `UnavailableException` indicates temporary unavailability, the portlet container may choose not to route any requests to the portlet during the time period of the temporary unavailability.

The portlet container may choose to ignore the distinction between a permanent and temporary unavailability and treat any `UnavailableException` as permanent and remove a portlet object that throws any `UnavailableException` from service.

A `RuntimeException` thrown during request handling must be handled as a `PortletException`.

The manner in which the exception is communicated to the end user is left to the portal implementation.

4.6.8 Thread Safety

Implementations of the portlet request and response objects are not guaranteed to be thread safe. This means that they must only be used within the scope of the thread invoking the portlet request handling methods.

Portlet applications should not pass references to the portlet request and response objects to other threads as the resulting behavior may be non-deterministic.

4.7 GenericPortlet

The `GenericPortlet` abstract class provides default functionality and convenience methods for handling portlet requests. Portlets implemented through extending the `GenericPortlet` class are also more robust against future changes in the Java Portlet Specification as such changes can be mitigated by the `GenericPortlet` implementation. The `GenericPortlet` class implements the `Portlet`, `HeaderPortlet`, `EventPortlet` and `ResourceServingPortlet` interfaces.

The following sections describe the functionality provided by the `GenericPortlet` class

4.7.1 Dispatching to `GenericPortlet` Annotated Methods

The `GenericPortlet` class will attempt to dispatch render, action, and event requests to generic portlet annotated methods based on the portlet mode, action name, and event name, respectively. The annotations processed by `GenericPortlet` are distinct from the portlet lifecycle method annotations mentioned in Section 4.2 Portlet Life Cycle Methods discussed above.

The `GenericPortlet` annotated method must be a public method within the class hierarchy of a class extending `GenericPortlet` and must be specified as the portlet class by the portlet configuration. The method must carry one of the following annotations:

- Action method: `@ProcessAction(name=<action name>)`. The action method must have the following signature:

  ```
  public void <method name> (ActionRequest, ActionResponse) throws PortletException, java.io.IOException;
  ```

- Render method: `@RenderMode(name=<portlet mode name>)`. The render method must have the following signature:

  ```
  public void <method name> (RenderRequest, RenderResponse) throws PortletException, java.io.IOException;
  ```

- Event method: `@ProcessEvent(qname=<event name>)`. The event method must have the following signature:

```
public void <method name> (EventRequest, EventResponse) throws PortletException, java.io.IOException;
```

4.7.2 Action Dispatching

When an action request is received, the `processAction` method in the `GenericPortlet` class reads the value of the action parameter with the name "`javax.portlet.action`" (represented by the constant `ActionRequest.ACTION_NAME`). If this parameter is not null, the `processAction` method attempts to locate an action method carrying a `@ProcessAction` annotation that has a name element equal to the action parameter value. If such a method is found, it will be invoked. Otherwise, no operation will be performed.

4.7.3 Event Dispatching

When an event request is received, the `processEvent` method in the `GenericPortlet` class reads the event `qname` and attempts to locate an event method carrying a `@ProcessEvent` annotation that has a `qname` element equal to the event `qname`. If such a method is found, it will be invoked. Otherwise, no operation will be performed.

4.7.4 Resource Serving Dispatching

By default the `serveResource` method in the `GenericPortlet` class does nothing.

However, if a portlet initialization parameter with the reserved name "`javax.portlet.automaticResourceDispatching`" is set to `true`, the `GenericPortlet` `serveResource` method will attempt to forward the request to the resource ID set on the URL triggering the resource request. If no resource ID is set, the `serveResource` method does nothing.

Since `GenericPortlet` performs a Request Dispatcher forward, portlets extending `GenericPortlet` and wishing to use the automatic resource request dispatching function should override the `serveResource` method in order to verify the resource ID before calling the `super.serveResource` method for automatic dispatching.

4.7.5 Header Dispatching

The default `renderHeaders` method does nothing.

4.7.6 Render Dispatching

Note: The support for the `javax.portlet.renderHeaders` portlet container runtime option described here and also in Section 9.4.2 Runtime Option javax.portlet.renderHeaders on page 53 pertains only to Version 2.0 portlets for compatibility purposes. The portlet container must recognize version 2.0 portlets based on the version information contained in the portlet deployment descriptor. For Version 3.0 portlets, the `RENDER_PART` request attribute will not be set. Version 3.0 portlets should implement the `HeaderPortlet` interface `renderHeaders` method or a corresponding `@HeaderMethod` annotated method to write headers or to write output to the portal response document `HEAD` section.

In order to allow portlets running on streaming portals to set header data, the portlet can set the `javax.portlet.renderHeaders` container runtime to `true`. A portlet container supporting

this container runtime option will set the RENDER_PART render request attribute to indicate that header requests will be processed. If the RENDER_PART portlet request attribute is set, it indicates that the render request will be processed twice in order to allow portlets to set header information and document HEAD section data.

When the portlet container calls the GenericPortlet render method with the RENDER_PART request attribute set to RENDER_HEADERS, the GenericPortlet render method will invoke the doHeaders method. The default doHeaders method does nothing. Portlets extending GenericPortlet can override the doHeaders method in order to set headers information.

When the portlet container calls the GenericPortlet render method with the RENDER_PART request attribute set to RENDER_MARKUP, or if the RENDER_PART attribute is not set, the GenericPortlet render method sets the title specified in the portlet definition in the deployment descriptor and invokes the doDispatch method.

The doDispatch method in the GenericPortlet class implements functionality to aid in the processing of requests based on the portlet mode the portlet is currently in (see Chapter 10 Portlet Modes on page 57).

First the doDispatch reads the portlet mode and attempts to locate a render method carrying a @RenderMode annotation that has a name element matching the portlet mode. If such a method is found, it will be invoked.

If no matching annotated method is found, GenericPortlet will dispatch to the following methods:

- doView for handling VIEW requests
- doEdit for handling EDIT requests
- doHelp for handling HELP requests

For any other portlet mode the GenericPortlet will throw a PortletException.

If the window state of the portlet (see Chapter 11 Window States) is MINIMIZED, the render method of GenericPortlet does not invoke any of the portlet mode rendering methods.

Typically, portlets will extend the GenericPortlet class directly or indirectly and they will either use the @RenderMode annotation or override the doView, doEdit, doHelp and getTitle methods instead of the render and doDispatch methods.

4.8 *Extended Annotation-Based Dispatching*

Portlet Specification 3.0 introduces a new request dispatching mechanism that extends the GenericPortlet-based dispatching concepts introduced in Section 4.7.1. The extended dispatching mechanism allows portlet methods to appear in any valid CDI managed bean provided by the portlet.

The managed bean containing the portlet method or methods is not required to implement a particular interface. However, each portlet method annotation imposes method signature requirements on the annotated method. If a portlet method annotation is applied to a method that does not meet the method signature requirement, the portlet container must not place the portlet in service. The appropriate error handling and message display is left as a portal implementation detail.

A portlet application may contain many portlets. The portlets within the portlet application are identified by a unique portlet name. Since the extended annotation-based dispatching mechanism emancipates the portlet methods from the portlet class, the developer must specify

the portlet name as an annotation element. If the annotation applies to a single portlet only, the annotation contains a required `String portletName` element for that purpose. The portlet container must invoke the annotated method when processing a corresponding request for the portlet identified by the portlet name.

Some annotations can apply to more than one portlet within the portlet application. In this case, the portlet method annotation will contain a required `String[] portletNames` element. The portlet container must invoke the annotated method when processing a corresponding request for a portlet whose name is contained in the `portletNames` element.

If the first array entry of the `portletNames` annotation element contains the reserved string `"*"`, the annotated method must be invoked for all portlets defined in the portlet application.

The portlet names appearing in the `portletName` and `portletNames` portlet method annotation elements need not be specified in the portlet deployment descriptor nor in a `@PortletConfiguration` annotation. The portlet container must register and make available for portal use all portlets whose names are defined in these elements. However, the reserved string `"*"` does not define a portlet.

The portlet container must ensure that each portlet defined through a portlet method annotation contains at least one render method annotation for the 'view' portlet mode. If this is not the case, the portlet container must not place the portlet in service.

Each portlet method annotation supports a method that accepts the native request and response types as arguments. Some portlet method annotations offer simplified method signatures. If the portlet uses a simplified method signature, it can obtain the request and response objects along with related portlet artifacts through the dependency injection mechanism. See Section 21.3 Portlet Predefined Beans on page 120 for a list of injectable portlet artifacts.

Annotated methods participating in the extended annotation-based dispatching mechanism need only declare a `throws` clause for exceptions that the method actually throws. If the method does not throw a checked exception, no `throws` clause is required. However, if a `throws` clause is present, the declared checked exceptions must be of type `PortletException` or `IOException`. If the annotated method declares any other type of checked exception in the throws clause, the portlet container must not place the portlet in service.

The following sections describe how the portlet container dispatches requests to the annotated portlet lifecycle methods.

4.8.1 Annotated Action Method Dispatching

The `@ActionMethod` annotation designates an action request processing method and corresponds to the `Portlet` interface `processAction` method. The annotated method must have the following signature:

```
public void <methodName>(ActionRequest, ActionResponse)
```

The method name can be freely selected.

The `@ActionMethod` annotation contains an `actionName` element which is used for more finely-grained request dispatching. A given portlet may define multiple `@ActionMethod` annotated methods that differ in the value of the `actionName` element. If the portlet defines more than one `@ActionMethod` annotated method with the same value of `actionName`, the portlet container must not place the portlet in service.

The portlet container must dispatch the `@ActionMethod` annotated method as follows:

1. When the portlet container receives a request from the client, it must check the value of the action parameter carrying the name `"javax.portlet.action"` (represented by the `ActionRequest.ACTION_NAME` string constant). If a `@ActionMethod` annotated method exists whose `actionName` element matches the parameter value, the portlet container must dispatch the action request to that method.
2. If no such method exists, the portlet container must dispatch the request to a `@ActionMethod` annotated method containing an empty `actionName` element ("", the default).
3. If no method is defined whose `@ActionMethod actionName` element is empty, and if the portlet class implements the `Portlet` interface, then the portlet container must invoke the `processAction` method.
4. Otherwise the portlet container must do nothing.

The effect of this procedure for portlets that extend `GenericPortlet` is that the existence of a matching `@ActionMethod` annotated method will override the `GenericPortlet processAction` functionality.

The `@ActionMethod` annotation contains an optional `publishingEvents` array element that allows the portlet to specify the qualified names for the portlet events it can fire during method execution. The qualified names must be defined in the portlet application configuration. The portlet container must register the publishing events defined in this array as valid publishing events for the portlet. See Section 28.1.8 Event Configuration on page 176 and Section 28.2.10 Event References on page 188 for more information on event configuration. See Chapter 18 Coordination between Portlets on page 106 for more information on event processing.

The `@ActionMethod` annotation defines the following elements.

Element	Description
`portletName`	The required portlet name element for which the annotated method applies.
`actionName`	String representing the action name. The default value is the empty string, "".
`publishingEvents`	Array of PortletQName elements representing the events published during method processing.

4.8.2 Annotated Event Method Dispatching

The `@EventMethod` annotation designates an event request processing method and corresponds to the `Portlet` interface `processEvent` method. The annotated method must have the following signature:

```
public void <methodName>(EventRequest, EventResponse)
```

The method name can be freely selected.

The `@EventMethod` annotation contains a required `processingEvents` element that defines the qualified names of the events the method can process. The qualified names must be defined in the portlet application configuration, as described in the previous section. The portlet container must register the processing events defined in this array as valid processing events for the portlet.

A given portlet may define multiple `@EventMethod` annotated methods that differ in the values provided by the `processingEvents` element. The values provided must be unique for the portlet. If the portlet defines duplicate entries for this element, or defines more than one `@EventMethod` annotated method with a given `processingEvents` element value, the portlet container must not place the portlet in service.

The portlet container dispatches event requests to `@EventMethod` annotated methods based on the configured values as follows:

1. The portlet container must determine that a given event is to be routed to the portlet. This is an implementation-specific determination.
2. The portlet container must route the event request to the `@EventMethod` annotated method that has a matching `processingEvents` entry.
3. If no such method exists, and if the portlet class implements the `EventPortlet` interface, then the portlet container must invoke the `processEvent` method.
4. Otherwise the portlet container must do nothing.

The effect of this procedure for portlets that extend `GenericPortlet` is that the existence of a matching `@EventMethod` annotated method will override the `GenericPortlet` class `processEvent` functionality.

The `@EventMethod` annotation contains a `publishingEvents` array element that allows the portlet to specify the qualified names for the portlet events it can fire during method execution. The qualified names must be defined in the portlet application configuration, as described in the previous section. The portlet container must register the publishing events defined in this array as valid publishing events for the portlet. See Section 28.1.8 Event Configuration on page 176 and Section 28.2.10 Event References on page 188 for more information on event configuration. See Chapter 18 Coordination between Portlets for more information on event processing.

The `@EventMethod` annotation defines the following elements.

Element	Description
`portletName`	The required portlet name element for which the annotated method applies.
`processingEvents`	Array of PortletQName elements representing the events processed by the method.
`publishingEvents`	Array of PortletQName elements representing the events published during method processing.

4.8.3 Annotated Header Method Dispatching

The `@HeaderMethod` annotation designates a header request processing method and corresponds to the `GenericPortlet` `doHeaders` method. The annotated method must have the following signature:

```
public void <methodName>(HeaderRequest, HeaderResponse)
```

The method name can be freely selected.

The purpose of this method is to allow the portlet to set HTTP headers, implementation-specific properties, and to allow the portlet to write markup to the overall document `HEAD` section. If the portlet defines `@HeaderMethod` annotated methods, the portlet container must invoke them before the overall portal application response is committed.

The portlet container should add any markup written to the given `HeaderResponse` object to the document `HEAD` section.

The `@HeaderMethod` annotation contains a `portletMode` element that the portlet container uses for request dispatching.

The portlet container must dispatch the `@HeaderMethod` annotated method as follows:

1. Tthe portlet container must identify the `@HeaderMethod` annotated methods whose `portletMode` element matches the portlet mode of the current request and invoke them in the order determined by the ordinal number (see below).
2. If there is no such method, the portlet container must identify the `@HeaderMethod` annotated methods whose `portletMode` element is empty ("") and invoke them in the order determined by the ordinal number (see below).
3. If there is no such method, but if the portlet class implements the `HeaderPortlet` interface, then the portlet container must invoke the `renderHeaders` method.
4. Otherwise the portlet container must do nothing.

A given portlet may define multiple `@HeaderMethod` annotated methods that match the portlet mode information. In this case, the order of execution is determined by the `ordinal` element within the annotation. Annotated methods with a lower ordinal number are executed before methods with a higher ordinal number. If two annotated methods have the same ordinal number, both methods will be executed, but the execution order will be undetermined.

The annotated method can apply to multiple portlets within the portlet application. The names of the portlets for which the listener applies must be specified in the `portletNames` element. A wildcard character '*' can be specified in the first `portletName` array element to indicate that the listener is to apply to all portlets in the portlet application. If specified, the wildcard character must appear alone in the first array element.

The `@HeaderMethod` annotation contains the following elements.

Element	Description	Default
`portletNames`	The portlet names for which the listener applies.	-none-
`ordinal`	The ordinal number for this annotated method.	0
`portletMode`	String value representing the portlet mode	`"view"`
`contentType`	The contentType for this request	`"text/html"`

4.8.4 Annotated Render Method Dispatching

The `@RenderMethod` annotation designates a render request processing method and corresponds to the `Portlet` interface `render` method. The annotated method must have one of the following signatures:

Method Signature
`public void <methodName>(RenderRequest, RenderResponse)`
`public String <methodName>()`
`public void <methodName>()`

The method name can be freely selected.

If the `@RenderMethod` annotated method returns a `String` and if the returned string is not `null`, the portlet container must add the return value to the render response output stream.

The `@RenderMethod` annotation contains a `portletMode` element that the portlet container uses for request dispatching.

The portlet container must dispatch the `@RenderMethod` annotated method as follows:

1. The portlet container must identify the `@RenderMethod` annotated methods whose `portletMode` element matches the portlet mode of the current request and invoke them in the order determined by the ordinal number (see below).
2. If there is no such method, the portlet container must identify the `@RenderMethod` annotated methods whose `portletMode` element is empty ("") and invoke them in the order determined by the ordinal number (see below).
3. If there is no such method, but if the portlet class implements the `Portlet` interface, then the portlet container must invoke the `render` method.
4. Otherwise the portlet container must do nothing.

A given portlet may define multiple `@RenderMethod` annotated methods that match the portlet mode information. In this case, the order of execution is determined by the `ordinal` element within the annotation. Annotated methods with a lower ordinal number are executed before methods with a higher ordinal number. If two annotated methods have the same ordinal number, both methods will be executed, but the execution order will be undetermined.

The annotated method can apply to multiple portlets within the portlet application. The names of the portlets for which the listener applies must be specified in the portletNames element. A wildcard character '*' can be specified in the first `portletName` array element to indicate that the listener is to apply to all portlets in the portlet application. If specified, the wildcard character must appear alone in the first array element.

The `@RenderMethod` annotation contains a `contentType` annotation. If this value is not empty, the portlet container must set the content type for the request prior to invoking the method according to the rules defined for the render request, see Section15.6 `RenderRequest` Interface. If this element is empty, the portlet container must do nothing.

The `@RenderMethod` annotation contains an `include` element. If this element is not empty, the portlet container must first execute the body of the annotated method and then perform a request dispatcher include on the `include` element value.

The `@RenderMethod` annotation contains the following elements.

Element	Description	Default
`portletNames`	The portlet names for which the listener applies.	-none-
`ordinal`	The ordinal number for this annotated method.	0

Element	Description	Default
`portletMode`	String value representing the portlet mode	`"view"`
`contentType`	The content type for this request	`"text/html"`
`include`	Specifies a JSP or servlet that will be included after the method body has been executed.	`""`

4.8.5 Resource Method Dispatching

The `@ServeResourceMethod` annotation designates a resource request processing method and corresponds to the `ResourceServingPortlet` interface `serveResource` method. The annotated method must have one of the following signatures:

Method Signature
`public void <methodName>(RenderRequest, RenderResponse)`
`public String <methodName>()`
`public void <methodName>()`

The method name can be freely selected.

If the `@ServeResourceMethod` annotated method returns a `String` and if the returned string is not `null`, the portlet container must add the return value to the resource response output stream.

The `@ServeResourceMethod` annotation contains a `resourceID` element that the portlet container uses for request dispatching.

The portlet container must dispatch the `@ServeResourceMethod` annotated method as follows:

1. The portlet container must identify the `@RenderMethod` annotated methods whose `resourceID` element matches the resource ID from the current request and invoke them in the order determined by the ordinal number (see below).
2. If there is no such method, the portlet container must identify the `@RenderMethod` annotated methods whose `resourceID` element is empty ("") and invoke them in the order determined by the ordinal number (see below).
3. If there is no such method, but if the portlet class implements the `ResourceServingPortlet` interface, then the portlet container must invoke the `serveResource` method.
4. Otherwise the portlet container must do nothing.

A given portlet may define multiple `@ServeResourceMethod` annotated methods that match the resource ID information. In this case, the order of execution is determined by the `ordinal` element within the annotation. Annotated methods with a lower ordinal number are executed before methods with a higher ordinal number. If two annotated methods have the same ordinal number, both methods will be executed, but the execution order will be undetermined.

The annotated method can apply to multiple portlets within the portlet application. The names of the portlets for which the listener applies must be specified in the portletNames element. A wildcard character '*' can be specified in the first `portletName` array element to indicate that the listener is to apply to all portlets in the portlet application. If specified, the wildcard character must appear alone in the first array element.

The `@ServeResourceMethod` annotation contains a `contentType` annotation. If this value is not empty, the portlet container must set the content type for the request prior to invoking the annotated method according to the rules defined for the resource request, see Section 15.4 `ResourceRequest` Interface. If this element is empty, the portlet container must do nothing.

The `@ServeResourceMethod` annotation contains a `characterEncoding` annotation. If this value is not empty, the portlet container must set the character encoding for the request prior to invoking the annotated method according to the rules defined for the resource request, see Section 15.4 `ResourceRequest` Interface. If this element is empty, the portlet container must do nothing.

The `@ServeResourceMethod` annotation contains an `include` element. If this element is not empty, the portlet container must first execute the body of the annotated method and then perform a request dispatcher include on the element value.

The `@ServeResourceMethod` annotation contains the following elements.

Element	Description	Default
`portletNames`	The portlet names for which the listener applies.	`-none-`
`ordinal`	The ordinal number for this annotated method.	`0`
`resourceID`	String value representing the resource ID	`""`
`characterEncoding`	The character encoding for this request	`"UTF-8"`
`contentType`	The content type for this request	`"text/html"`
`include`	Specifies a JSP or servlet that will be included after the method body has been executed.	`""`

Chapter 5 Conditional Dispatching

Conditional dispatching allows the portlet developer to add metadata to certain annotated portlet lifecycle methods in the form of portlet container-specific or portlet application-specific annotations. The annotation metadata can contain device identification data, supported languages, supported content type, or other information.

The portlet container or the portlet application can use the additional metadata along with information from the portlet request and response objects to select methods for invocation.

The Portlet Specification allows the portlet container or the portlet application to define such annotations and to implement dispatching algorithms based on them for methods annotated with the `@HeaderMethod`, `@RenderMethod`, and `@ServeResourceMethod` annotations.

- The portal vendor can define annotations that the portlet container can use to select annotated methods for invocation in a proprietary manner.
- The portlet application developer can define annotations along with a conditional dispatcher extension. The conditional dispatcher extension can use the portlet application-specific annotations to select annotated methods for invocation by the portlet container.

The definition of the actual annotation metadata itself and the workings of any portlet container-specific or portlet application-specific dispatching algorithm based on the annotation metadata is beyond the scope of the Portlet Specification.

5.1 Overview

Conditional dispatching supplements the method dispatching mechanism described in Sections 4.6 and 4.8 by enhancing the method selection step #4 in the portlet request processing sequence described on page 26. Figure 5–1 Conditional Dispatching below illustrates the conditional dispatching mechanism.

Conditional dispatching takes place during the portlet request processing sequence after the portlet container has prepared the portlet execution environment and invoked any configured filters, but prior to invocation of any annotated portlet lifecycle methods.

The portlet container first determines the set of methods that are candidates for invocation. For a header request, this would be all methods annotated with `@HeaderMethod`, for a render request, this would be all methods annotated with `@RenderMethod`, and for a resource request, this would be all methods annotated with `@ServeResourceMethod`.

The portlet container then invokes the conditional dispatcher extension provided by the portlet application, if present. The portlet application conditional dispatcher can access annotation metadata applied to the portlet methods in order to determine the methods that the portlet container should invoke. It can also choose to allow the portlet container to handle the dispatching rather than selecting the methods itself.

If the portlet application either does not provide a conditional dispatching extension or if the extension defers method selection to the portlet container, the portlet container may access implementation-specific annotation metadata to perform conditional dispatching.

Finally, if the portlet does not use portlet container implementation-specific annotations, then the portlet container must perform the dispatching as described in Section 4.8.

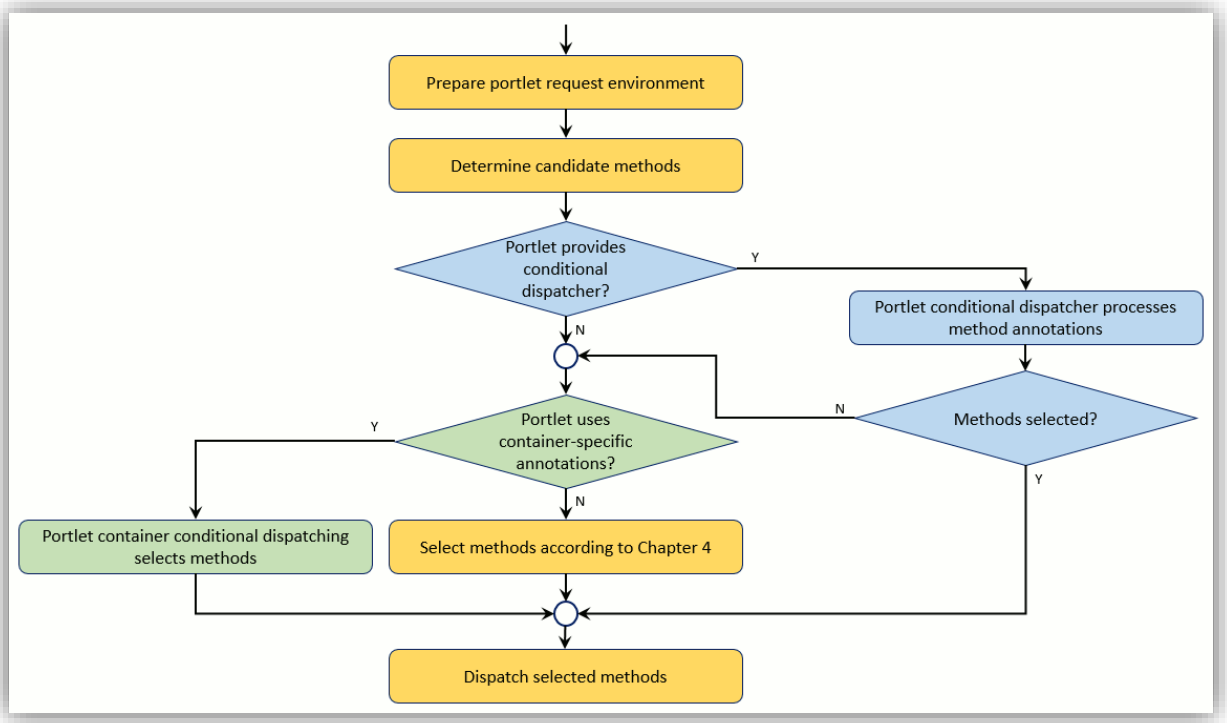


Figure 5–1 Conditional Dispatching Flow

5.1 Portlet Container Conditional Dispatching

The portlet container may define vendor-specific annotations that can be applied to methods annotated with the `@HeaderMethod`, `@RenderMethod`, and `@ServeResourceMethod` annotations. When a portlet makes use of the vendor-specific annotations, the portlet container may provide an implementation-specific dispatching mechanism based on all portlet method annotation metadata along with the portlet request and response information.

For example, the portlet container might provide an implementation-specific `@DeviceType` annotation that would allow the container to invoke the appropriate portlet method for a given device. A portlet might use this annotation as shown below:

```
@DeviceType("tablet")
@RenderMethod(portletNames={"MyPortlet"})
public void doView(RenderRequest request, RenderResponse response) {
   ...
}
```

Any annotation definitions and configuration or extension mechanism that the portlet container provides in order to support conditional dispatching is beyond the scope of this document.

5.2 Portlet Conditional Dispatching

The portlet may define its own annotations along with a conditional dispatcher extension for processing them.

The portlet container invokes the portlet conditional dispatcher extension with the appropriate request and response objects along with a `Set` that contains method token objects representing

the candidate methods. The method tokens allow access to all annotation metadata applied to the method.

The portlet conditional dispatcher extension can use the metadata contained in the method tokens to determine whether or not a given method should be invoked, and should return a `List` containing the method tokens for the methods that portlet container must invoke. If the method returns a non-`null` list, the portlet container must invoke the methods in the order they appear in the list, and then perform no further dispatching operation for the current request.

The list may be empty, in which case the portlet container must invoke no methods. The portlet container may provide an appropriate message if this case occurs and if the portlet conditional dispatcher has not written to the portlet response output stream. The list may contain a given method token more than once, in which case the portlet container must invoke the corresponding method once for each appearance.

The portlet conditional dispatching method returns `null` to indicate to the portlet container that the methods were not handled. In this case, the portlet container can perform its implementation-specific conditional dispatching.

If the conditional dispatching method throws an exception, the portlet container must treat it as an unhandled exception during request processing and must perform no further dispatching.

5.2.1 Interfaces

The `ConditionalDispatcher` interface describes three conditional dispatching methods that apply to annotated portlet request dispatching methods as follows:

`@RenderMethod`	`public List<MethodToken> dispatch(`
	`  RenderRequest request, RenderResponse response,`
	`  Set<MethodToken> methods)`
	`  throws IOException, PortletException;`

`@HeaderMethod`	`public List<MethodToken> dispatch(`
	`  RenderRequest request, RenderResponse response,`
	`  Set<MethodToken> methods)`
	`  throws IOException, PortletException;`

`@ServeResourceMethod`	`public List<MethodToken> dispatch(`
	`  ResourceRequest request, ResourceResponse response,`
	`  Set<MethodToken> methods)`
	`  throws IOException, PortletException;`

Table 5–1 Conditional Dispatcher Methods

The request and response arguments for each of the dispatch methods are of the appropriate type to handle the request. The `methods` object provides the `MethodToken` objects representing the candidate methods.

The `MethodToken` object uniquely identifies a candidate annotated method and provides access to the method annotation metadata.

The `MethodToken` interface `getAnnotation` method allows the portlet conditional dispatcher developer to retrieve an annotation of a given type. The `isAnnotationPresent` method allows the developer to determine whether a given annotation type is present. The `getAnnotations` method allows the developer to retrieve all annotations attached to the method represented by the method token.

5.2.2 Configuration through the Deployment Descriptor

The conditional dispatcher must be configured either in the portlet deployment descriptor or through annotations.

The conditional dispatcher is configured in the portlet deployment descriptor through use of the `conditional-dispatcher` element. This element contains a `dispatcher-class` element that designates a `ConditionalDispatcher` class.

If the conditional-dispatcher element is declared in the portlet application configuration, it configures the conditional dispatcher for all portlets in the portlet application. If it is declared in the portlet configuration, it configures the conditional dispatcher for that specific portlet only.

A conditional dispatcher may be configured only once per portlet. If more than one conditional dispatcher is declared, the portlet container must recognize the configuration error and must not place the portlet in service.

However, a conditional dispatcher can be specified in the portlet deployment descriptor to override a conditional dispatcher configured through annotations. Also, a conditional dispatcher can be declared in the portlet configuration to override a conditional dispatcher configured in the portlet application configuration.

If the portlet deployment descriptor declares an empty `dispatcher-class` element, the portlet container must disable all conditional dispatching methods provided by the portlet application for the specific portlet or for the entire portlet application, depending on whether the element appears in the portlet configuration or the portlet application configuration. The portlet container should carry out its implementation-specific conditional dispatching or default dispatching as if no conditional dispatching method were provided by the portlet application.

5.2.3 Configuration through Annotation

The `@ConditionalDispatchMethod` annotation designates a conditional method dispatcher method. The method may be located in any valid CDI managed bean class provided by the portlet.

The portlet container must invoke the `@ConditionalDispatchMethod` annotated method before any portlet request processing method of the corresponding type is invoked.

The annotated method must have one of the signatures specified in Table 5–1 Conditional Dispatcher Methods above. However, the method is only required to specify a `throws` clause for those exceptions it actually throws.

The method name can be freely selected.

If the `@ConditionalDispatchMethod` annotation is applied to a method that does not meet the method signature requirement, the portlet container must not place the portlet in service. The appropriate error handling and message display is left as a portal implementation detail.

For a given portlet name, only a single method may be annotated for a given method signature. If more than one such method is annotated, the portlet container must recognize the configuration error and must not place the portlet in service.

Portlets should generally configure conditional dispatch methods either exclusively through the deployment descriptor or exclusively through annotations. If configured through both means, the conditional dispatcher declared in the portlet deployment descriptor will override any annotated conditional dispatcher method.

The annotated conditional dispatcher method can apply to multiple portlets within the portlet application. The names of the portlets for which the conditional dispatcher applies must be specified in the `@ConditionalDispatchMethod` annotation `portletNames` element. A wildcard character '*' can be specified in the first `portletName` array element to indicate that

the listener is to apply to all portlets in the portlet application. If specified, the wildcard character must appear alone in the first array element. The annotated method applies to all portlets in the portlet application by default.

The `@ConditionalDispatchMethod` annotation contains the following elements.

Element	Description
`portletNames`	The portlet names for which the conditional dispatching method applies.

5.3 Example

This section provides an example that shows a simple conditional dispatcher for `@RenderMethod` annotated methods. The example consists of several components.

The `@AppSpecificAnnotation` allows the portlet developer to add device attribute metadata to portlet methods.

```
public @interface AppSpecificAnnotation {

   // Specifies name of the device attribute to examine for method dispatching.
   String   deviceAttribute() default "";

   // Regular expression used in conjunction with the deviceAttribute element.
   String   deviceMatch() default "";
}
```

The `OrdinalComparator` is portlet-specific code that compares two method tokens based on the ordinal number contained in the `@RenderMethod` annotation. This code is written specifically for comparing `@RenderMethod` annotated methods.

```
// Simple comparator based on the ordinal number from the RenderMethod annotation.
public class OrdinalComparator implements Comparator<MethodToken> {
   @Override
   public int compare(MethodToken o1, MethodToken o2) {
      RenderMethod rm1 = o1.getAnnotation(RenderMethod.class);
      RenderMethod rm2 = o2.getAnnotation(RenderMethod.class);
      assert (rm1 != null) && (rm2 != null);
      return Integer.compare(rm1.ordinal(), rm2.ordinal());
   }
}
```

The conditional dispatcher itself is configured through use of the `@ConditionalDispatchMethod` annotation. Note that the annotated conditional dispatcher method applies to all portlets in the portlet application, since the annotation provides no portlet names.

The conditional dispatcher processes all candidate methods looking for those that are annotated with `@AppSpecificAnnotation`. For each such annotation, the conditional dispatcher tests whether the device metadata from the annotation matches the device information provided by the request. If so, the method token representing the method is added to the list of methods to be executed. Finally, the resulting method list is sorted by ordinal number using the `OrdinalComparator`.

If no method is annotated with `@AppSpecificAnnotation`, the conditional dispatcher returns null, allowing the portlet container to continue with implementation-specific dispatching.

```
// Simple conditional dispatcher based on device characteristics.
public class ConditionalDispatch {

   // no portlet names specified, so applies to all portlets in the portlet application
   @ConditionalDispatchMethod
   public List<MethodToken> dispatch(
         RenderRequest request, RenderResponse response,
         Set<MethodToken> methods)
         throws IOException, PortletException {

      // Get CC/PP device profile from request. If not possible, we can't perform
      // the dispatching logic, so let container dispatch
      Profile prof = (Profile) request.getAttribute(PortletRequest.CCPP_PROFILE);
      if (prof == null) {
         return null;
      }

      // Get each token and check it for device metadata that matches the device
      // information from the current request. If there is a match, add to the list
      // of methods to be executed.
      ArrayList<MethodToken> tokens = new ArrayList<MethodToken>();
      boolean isAnnoPresent = false;
      for (MethodToken mt : methods) {
         AppSpecificAnnotation anno = mt.getAnnotation(AppSpecificAnnotation.class);
         if (anno != null) {
            isAnnoPresent = true;
            if (anno.deviceAttribute().length() > 0
                && anno.deviceMatch().length() > 0) {
               String attr = prof.getAttribute(anno.deviceAttribute()).toString();
               if (attr.matches(anno.deviceMatch())) {
                  tokens.add(mt);
               }
            }
         }
      }

      // If no application-specific annotations were present, let container dispatch
      if (!isAnnoPresent) {
         return null;
      }

      // Sort the resulting list according to ordinal number
      Collections.sort(tokens, new OrdinalComparator());

      return tokens;
   }
}
```

The portlet would use the `@AppSpecificAnnotation` with a render method as shown below. The method would be invoked when the user agent string indicates an Android tablet.

```
@AppSpecificAnnotation(deviceAttribute="User-Agent",
                       deviceMatch=".*Android.* (?!Mobile)'")
@RenderMethod(portletNames={"MyPortlet"})
public void doView(RenderRequest request, RenderResponse response) {
   ...
}
```

Chapter 6 Portlet Applications

A portlet application is a web application as defined in the *Servlet Specification*. It can contain one or more portlets identified by annotations or through the portlet deployment descriptor in addition to servlets, JSPs, HTML pages, Java classes and other resources normally found in a web application. A standard-conforming portlet application can run on standard portlet containers.

6.1 Relationship with Web Applications

Portlets contained within the portlet application are managed by the portlet container. All other components and resources are managed by the servlet container underlying the portlet container.

Servlets, JSP™ pages, related Java classes, and static documents managed by the servlet container must be declared according to the *Servlet Specification 3.1*.

Portlets and other artifacts managed by the portlet container must be declared as described in this specification.

6.2 Relationship to the Portlet Context

The portlet container must enforce a one to one correspondence between a portlet application and its portlet context. If the application is a distributed application, the portlet container must create a single `PortletContext` instance per VM. A `PortletContext` object provides a portlet with information about the application.

6.3 Portlet Application Classloader

The portlet container must load the portlets and related resources within the portlet application with the same `ClassLoader` used by the underlying servlet container.

The portlet container must ensure that requirements defined in the servlets specification sections on 'Dependencies on Extensions' and 'Web Application Class Loader'[5] are fulfilled.

6.4 Directory Structure and Portlet Application Archive File

A portlet application follows the same hierarchical directory structure as web applications.

Portlet classes, utility classes and other resources accessed through the portlet application class loader must reside within the `/WEB-INF/classes` directory or within a JAR file in the `/WEB-INF/lib/` directory.

Portlet applications are packaged as web application archives (WAR) as defined in the *Servlet Specification*[6] Chapter.

[5] *Servlet Specification 3.1 sections 10.7.1* and *10.7.2*

[6] *Servlet Specification 3.1 sections 10.5* and *10.6*

6.5 Portlet Application Deployment Descriptor

In addition to a web application deployment descriptor, a portlet application may contain a `/WEB-INF/portlet.xml` deployment descriptor file. Most configuration tasks can be carried out though use of annotations, however, the portlet deployment descriptor is required for certain configuration settings. The portlet deployment descriptor need not be present if the descriptor-only settings are not required.

Refer to Chapter 27 Packaging and Deployment for more details on the portlet application deployment descriptor.

6.6 Replacing a Portlet Application

A portlet container should be able to replace a portlet application with a new version without restarting the container. In addition, the portlet container should provide a robust method for preserving session data for the portlet application when the portlet application is replaced.

6.7 Error Handling

Error handling during request processing is left to the portlet container implementation.

For example, when an exception is thrown during request processing, the portal could render an error page instead of the portal page, render an error message in the portlet window of the portlet that threw the exception, or remove the portlet from the portal page and log an error message for the administrator.

6.8 Portlet Application Environment

The Portlet Specification requires the execution environment described by the Servlet Specification as a prerequisite.[7]

[7] See in particular *Servlet Specification 3.1 section 15.2.2*

Chapter 7 The PortletConfig Interface

The `PortletConfig` object provides the portlet object with configuration information. The configuration can be taken from annotations or from the portlet deployment descriptor, see Chapter 28 Configuration. It also provides access to the portlet context, default event namespace, public render parameter names, and the resource bundle that provides title-bar resources.

7.1 Initialization Parameters

The `getInitParameterNames` and `getInitParameter` methods of the `PortletConfig` interface return the initialization parameter names and values found in the portlet definition in the portlet configuration.

7.2 Portlet Resource Bundle

The portlet configuration may specify some basic information that can be used for the portlet title-bar and for the portal's categorization of the portlet. The specification defines a few resource elements for these purposes - the title, short-title, and keywords (see Section 28.2.5 Portlet Resource Bundle on page 184).

These resource elements can be directly included in the portlet configuration, or they can be placed in a resource bundle.

If the resources are defined in a resource bundle, the portlet configuration must provide the name of the resource bundle.

If the portlet configuration defines a resource bundle, the portlet container must look up these values in the ResourceBundle. If the root resource bundle does not contain the resources for these values and the values are defined in the configuration, the portlet container must add these values as resources of the root resource bundle. Values from the resource bundle have precedence over values defined directly in the configuration.

If the portlet definition does not define a resource bundle and the information is defined directly in the configuration, the portlet container must create a `ResourceBundle` and populate it with the directly defined values using the keys defined in Section 28.2.5 Portlet Resource Bundle.

The title, short title, keywords, and resource bundle elements are optional configuration elements.

If neither the title element nor a resource bundle element containing a tile are present, the portlet title will not be explicitly defined. In this case, it is left as a portlet container implementation detail to draw on other information, for example on the <portlet-name> or <display-name> values from the portlet descriptor, to define the portlet title.

The `getResourceBundle` method returns the resource bundle for a given `Locale`.

The `render` method of the `GenericPortlet` class uses the `ResourceBundle` object provided by the `PortletConfig` to retrieve the title of the portlet from the associated ResourceBundle or from the corresponding elements directly defined in the configuration.

7.3 Default Event Namespace

The `getDefaultNamespace` method of the `PortletConfig` interface returns the default namespace for events and public render parameters set in the configuration or the XML default namespace `XMLConstants.NULL_NS_URI` if no default namespace is provided in the portlet configuration.

7.4 Public Render Parameters

The `getPublicRenderParameterNames` method returns the public render parameter names defined in the portlet configuration or an empty enumeration if no public render parameters are defined for the current portlet definition.

The `getPublicRenderParameterDefinitions` method returns a map of the public render parameter names to their qualified names represented by a `Qname` object or an empty map if no public render parameters are defined for the current portlet definition.

7.5 Publishing Event QNames

The `getPublishingEventQNames` method of the `PortletConfig` interface returns the publishing event qualified names found in the portlet configuration or an empty enumeration if no publishing events are defined for the current portlet definition.

If the event was defined using the portlet deployment descriptor `name` element instead of the `qname` element, the defined default namespace must be added as namespace for the returned QName.

7.6 Processing Event QNames

The `getProcessingEventQNames` method of the `PortletConfig` interface returns the processing event qualified found in the portlet configuration or an empty enumeration if no processing events are defined for the current portlet definition.

If the event was defined using the portlet deployment descriptor `name` element instead of the `qname` element, the defined default namespace must be added as namespace for the returned QName.

7.7 Supported Locales

The `getSupportedLocales` method of the `PortletConfig` interface returns the supported locales found in the portlet configuration or an empty enumeration if no supported locales are defined for the current portlet definition.

7.8 Supported Container Runtime Options

The `getContainerRuntimeOptions` method returns an immutable `Map` containing portlet application level container runtime options merged with the portlet level container runtime options. The runtime options defined at the portlet level take precedence over the values with the same names defined at the portlet application level.

Different portlet containers may support different sets of portlet container runtime options. The map returned by the `getContainerRuntimeOptions` method must only contain those values

that are both defined for the portlet and supported by the portlet container. If no portlet container runtime options meet these criteria, the returned map must be empty.

The keys of the returned map are of type `String`. The values in the map are of type `String` array

See Section 9.4 Portlet Container Runtime Options on page 53 for a list of all predefined container runtime options.

7.9 Portlet Modes

The portlet configuration can specify the portlet modes supported by the portlet. The supported portlet modes may be a subset of the standard portlet modes, and may include custom portlet modes.

A portal implementation may define custom portlet modes that are managed by the portal. Portlets can declare additional custom portlet modes that are managed by the portlet. Custom portlet modes declared in the portlet descriptor as portal managed that are not supported by the portal are ignored.

The `getPortletModes` method returns an enumeration of the portlet modes available to the portlet. The enumeration includes the standard portlet modes supported by the portlet, the declared portal-managed modes supported by the portal, and the declared portlet-managed modes.

7.9.1 Window States

The portlet configuration can specify the window states supported by the portlet. The supported window states always include the standard window states, and may include custom window states.

Portlets can declare support for custom window states in the deployment descriptor. Custom window states declared in the portlet descriptor that are not supported by the portal are ignored.

The `getWindowStates` method returns an enumeration of the window states available to the portlet. The enumeration includes the standard window states and the custom window states declared by the portlet and supported by the portal.

Chapter 8 Portal Context

The `PortalContext` interface provides read-only information about the portal that is invoking the portlet.

A portlet obtains a `PortalContext` object from the portlet request object using `getPortalContext` method.

8.1 Portal Context Methods

The `getPortalInfo` method returns information such as the portal vendor and portal version.

The `getProperty` and `getPropertyNames` methods return portal properties.

The `getSupportedPortletModes` method returns all portlet modes supported by the portal. The portlet modes will include the standard portlet modes EDIT, HELP, VIEW.

The `getSupportedWindowStates` method returns allwindow states supported by the portal. The window states will include the standard window states MINIMIZED, NORMAL, MAXIMIZED.

8.2 Support for Markup Head Elements

If a portlet with a version 2.0 or earlier deployment descriptor is deployed, the portlet container must provide behavior described in this section in order to assure backward compatibility. For version 3.0 or later portlets, the behavior described in this section is to be disregarded.

A portal can optionally support adding markup to the HTML document head section through use of the `MimeResponse.setProperty` method. The Portal should indicate support for this property through the `PortalContext.MARKUP_HEAD_ELEMENT_SUPPORT` (value: "`javax.portlet.markup.head.element.support`") property on the `PortalContext`.

A non-null value of `MARKUP_HEAD_ELEMENT_SUPPORT` indicates that the portal application supports the `MARKUP_HEAD_ELEMENT` property

Chapter 9 Portlet Context

The `PortletContext` interface provides a view of the portlet application within which the portlet is running. Using the `PortletContext` object, a portlet can log events, obtain portlet application resources, portlet application and portlet-specific runtime options, and set and store attributes that other portlets and servlets in the portlet application can access.

9.1 Scope of the Portlet Context

There is one instance of the `PortletContext` interface associated with each portlet application deployed into a portlet container. In cases where the container is distributed over many virtual machines, a portlet application will have an instance of the `PortletContext` interface for each VM.

9.2 Portlet Context functionality

The portlet can access context initialization parameters, retrieve and store context attributes, obtain static resources from the portlet application, and obtain a request dispatcher to include servlets and JSPs through the `PortletContext` interface.

9.3 Relationship to the Servlet Context

A portlet application is an extended web application. As a web application, a portlet application also has a servlet context. The portlet context leverages most of its functionality from the servlet context of the portlet application. However, the context objects themselves aredifferent objects.

The context-wide initialization parameters are the same as initialization parameters of the servlet context and the context attributes are shared with the servlet context. Therefore, they must be defined in the web application deployment descriptor (the `web.xml` file). The initialization parameters accessible through the `PortletContext` must be the same as those accessible through the `ServletContext` of the portlet application.

Context attributes set through the `PortletContext` must be stored in the `ServletContext` of the portlet application. A direct consequence of this is that data stored in the `ServletContext` by servlets or JSPs is accessible to portlets through the `PortletContext` and vice versa.

The `PortletContext` must offer access to the same set of resources the `ServletContext` exposes.

The PortletContext must handle the same temporary working directory the ServletContext handles. It must be accessible as a context attribute using the same constant defined in the *Servlet Specification* - `javax.servlet.context.tempdir`. The portlet context must follow the same behavior and functionality defined for the servlet context for virtual hosting and reloading considerations. (See *Servlet Specification Version 3.1*):

9.3.1 Correspondence between ServletContext and PortletContext methods

The following methods of the `PortletContext` should provide the same functionality as the methods of the `ServletContext` of similar name: `getAttribute`, `getAttributeNames`, `getInitParameter`, `getInitParameterNames`, `getMimeType`, `getRealPath`, `getResourceID`, `getResourcePaths`, `getResourceAsStream`, `log`, `removeAttribute` and `setAttribute`.

9.4 Portlet Container Runtime Options

The portlet can define additional runtime behavior in the `portlet.xml` on either the portlet application level or the portlet level with the container-runtime-option element. Runtime options that are defined on the application level should be applied to all portlets in the portlet application. Runtime options that are defined on the portlet level should be applied for this portlet only and override any runtime options defined on the application level with the same name.

The container runtime option `javax.portlet.actionScopedRequestAttributes` must be supported by the portlet container.

Support for all other container runtime options is optional. The portlet can find out which container runtime options are supported by the portlet container through the `PortletContext.getContainerRuntimeOptions` method. This method returns an enumeration of type String containing the keys of all container runtime options that the current portlet container supports.

Section 28.2.2 Portlet Container Runtime Options describes configuration of the portlet container runtime options.

9.4.1 Runtime Option javax.portlet.escapeXml

The Java Portlet Specification V1.0 did not define XML escaping of URLs written by the tag library. Such portlets may have been coded with the assumption that the URLs were not XML escaped. In order to be able to run these portlets on a Java Portlet Specification V 2.0 or later container, the URL escaping behavior can be set through the `javax.portlet.escapeXml` container runtime option. The value of this setting can either be `true` for XML escaping URLs by default, or `false` for not XML escaping URLs by default.

Portlets that require URLs written to the output stream by the portlet tag library not to be XML escaped by default should therefore define the following container runtime option in the portlet configuration.

If the portlet has defined the `javax.portlet.escapeXml` container runtime option, the portlet container should honor this setting as otherwise the portlet may not work correctly.

9.4.2 Runtime Option javax.portlet.renderHeaders

There are cases in which the portlet may want to return header information, or other information that is required before getting the markup, like the portlet title or the next possible portlet modes, in the render phase. However, some portal implementations may choose a streaming implementation and thus do not buffer the output of the portlet. In order to support these implementations, the Java Portlet Specification provides the `javax.portlet.renderHeaders` container runtime setting and the `RENDER_PART` request attribute that these streaming portal

such implementations can set. Portlets that want to ensure that they run with maximum performance on all portal implementations should leverage this mechanism for:

- Setting cookies
- Setting headers
- Setting the title
- Returning new possible portlet modes

Portlets that need to write any headers in the render phase can set the additional container-runtime-option with name `javax.portlet.renderHeaders` and value `true`. The default for this setting is `false`. When set to `true`, streaming portal implementations should call the `render` method of the portlet twice with the `RENDER_PART` attribute set in the render request (see Section 15.1.2.3 The Render Part Request Attribute).

9.4.3 Runtime Option javax.portlet.servletDefaultSessionScope

By default, the session variable of included / forwarded servlets or JSPs maps to the portlet session with application scope. Some portlets may require that the session variable of included / forwarded servlets or JSPs maps instead to the portlet session with portlet scope in order to work correctly. This portlet container runtime option specifies the desired behavior. Setting it to `PORTLET_SCOPE` maps the session variable to the portlet session with portlet scope, while setting it to `APPLICATION_SCOPE` maps the session variable to the portlet session with application scope (the default).

Portlet developers should note that not all portlet containers may be able to provide this feature as a portable Java EE solution does not currently exist. Therefore, relying on this feature may restrict the numbers of portlet containers the portlet can be executed on.

9.4.4 Runtime Option javax.portlet.actionScopedRequestAttributes

The Java Portlet Specification follows a model of separating concerns in different lifecycle methods, like `processAction, processEvent, render`. This provides a clean separation of the action semantics from the rendering of the content. However, it may create some issues with servlet-based applications that don't follow this strict Model-View-Controller pattern. Such applications might assume that attributes set in the action phase will be accessible during the render phase. The Java Portlet Specification provides the render parameters for such use cases, but some applications need to transport complex objects instead of strings.

One example would be a Java Server Faces (JSF) bridge portlet that expects to be executed in a single lifecycle phase for processing actions, events, and rendering from the JSF point of view and thus needs to transport attributes from action to subsequent event and render calls until the next action occurs.

For such use cases the Java Portlet Specification provides action-scoped request attributes as container runtime option with the intent to provide portlets with these request attributes until a new action occurs. This container runtime option must be supported by portlet containers.

Portlets should note that using this container runtime option will result in increased memory usage and thus may have a decreased performance as the portlet container needs to maintain and store these attributes across requests.

Portlets that want to leverage the action-scoped request attributes must to set the container runtime option `javax.portlet.actionScopedRequestAttributes` to `true`, default is `false`. In addition, the portlet may provide a value called `numberOfCachedScopes` where the following value element must be a positive number indicating the number of scopes the portlets

wants to have cached by the portlet container. This value is a hint to the portlet container that the portlet container may not be able to honor because of resource constraints. The order of the values in the portlet deployment descriptor must be `true`, `numberOfCachedScopes`, `<number of cached scopes>`.

9.4.4.1 Action Scope ID Render Parameter

The portlet container must store the action scope ID as render parameter with the name "`javax.portlet.as`", defined as `PortletRequest.ACTION_SCOPE_ID`. When using the action-scoped request attribute extension the portlet must not use this render parameter name as a private or public render parameter name.

The portlet container must provide the action scope ID render parameter and its value when calling one of the portlet lifecycle methods and is responsible for setting the action scope ID at the end of the action phase.

If the portlet removes the `PortletRequest.ACTION_SCOPE_ID` render parameter through a `PortletURLGenerationListener`, the portlet container should create a portlet URL without this render parameter. This allows the portlet to create resource URLs that are cacheable across action scopes.

9.4.4.2 Lifetime of Action-scoped Request Attributes

The portlet can view attributes set on action, event, or resource requests in any of its lifecycle requests lasting until the next action occurs, or until some timeout or invalidation mechanism of the portlet container frees up the occupied memory, e.g. the user session has timed out.

A new action scope is started when

- An action request is processed: starts a new action scope with a new scope ID, all previous attributes are no longer accessible, new attributes can be stored.
- A render request with no existing scope ID is processed: starts a new scope without any scope ID, all previous attributes are no longer accessible, no new attributes can be stored.
- An event request with no existing scope ID is processed: starts a new action scope with a new scope ID, all previous attributes are no longer accessible, new attributes can be stored.
- An event request is processed after the first render for this scope has occurred: This event will likely have action semantics. All previous attributes are no longer accessible, new attributes can be stored.

The existing scope is preserved with the current scope ID and action-scoped attributes when

- A render request with an existing scope ID is processed
- An event request with an existing scope ID is processed before the first render request for this scope
- A resource request with an existing scope ID is processed

The following attributes are not stored in the action scope by the portlet container:

- all attributes starting with `javax.portlet`
- all Java Portlet Specification defined objects, like request, response, session, as they are only valid for the current request
- any other attributes the provided by the portlet container handling the request

The portlet may also filter out attributes that should not be stored in the action-scope at the end of the request either via `removeAttribute` or via a response filter.

Non-serializable objects used as attribute values might not be available across requests, for example when session replication is used. However, portlet containers should either provide the complete set of attributes to the portlet or discard the entire set of attributes in order to allow the portlet to always run in a consistent state.

9.4.4.3 ServeResource Calls

If a `serveResource` call is triggered by a resource URL with a cache level of `FULL` the action scope ID may not be included and thus the portlet may not have access to the action-scoped attributes.

9.4.4.4 Examples

Example 1:

- portlet receives a processAction call and sets attribute foo, new scope contains foo
- portlet receives a processEvent call reads foo and sets bar, scope contains foo, bar
- portlet receives a render call, scope contains foo, bar
- portlet receives a processEvent call and sets foo2, new scope contains foo2
- portlet receives a render call, scope contains foo2

Example 2:

- portlet receives a render call, empty scope
- portlet receives a processEvent call and sets foo and bar, new scope contains foo, bar
- portlet receives a serveResource call, scope contains foo, bar and sets foo' and bar2, new scope contains foo', bar and bar 2

9.4.4.5 Semantics for Portlet Containers

In order to provide a consistent user experience for end users, the portlet container should cache previous action-scoped attributes in order to allow the end user to navigate between different views with the browser forward and backward buttons. The portlet container should use the specified `numberOfCachedScopes` provided by the portlet or a meaningful default if the portlet has not provided this value.

In order to determine if a render has already occurred for the current action-scope it is assumed that the portlet container stores a bit invisible to the portlet in the action-scoped attributes that indicates if a render has already occurred.

Chapter 10 Portlet Modes

A portlet mode indicates the function a portlet is performing in the render phase. Normally, portlets perform different tasks and create different content depending on the function they are currently performing. A portlet mode advises the portlet what task it should perform and what content it should generate. When invoking a portlet, the portlet container provides the current portlet mode to the portlet. Portlets can programmatically change their portlet mode during the action phase.

The Portlet Specification defines three portlet modes - `VIEW`, `EDIT`, and `HELP`. The `PortletMode` class defines constants for these portlet modes.

The availability of the portlet modes, for a portlet, may be restricted to specific user roles by the portal. For example, anonymous users could be allowed to use the `VIEW` and `HELP` portlet modes but only authenticated users could use the `EDIT` portlet mode.

10.1 `VIEW` Portlet Mode

The view mode represents the standard, or base, operating mode for a portlet. The view mode must be supported by all portlets, and can generally be viewed by all users who can access the portlet.

In view mode, the portlet should display its main operative content. For example, a stock ticker portlet should display the actual stock price information rather than configuration screens for adding stock symbols. However, this is just a recommendation rather than a rule.

The `VIEW` portlet mode of a portlet may include one or more screens that the user can navigate and interact with, or it may consist of static content that does not require any user interaction.

Portlet developers should implement the `VIEW` portlet mode functionality by overriding the `doView` method of the `GenericPortlet` class, by providing a method annotated with `@RenderMode` in a class extending `GenericPortlet`[8], or providing a method annotated with `@RenderMethod` in a managed bean class[9].

Portlets must support the `VIEW` portlet mode.

10.2 `EDIT` Portlet Mode

Within the `EDIT` portlet mode, a portlet should provide content and logic that lets a user customize the behavior of the portlet. The `EDIT` portlet mode may include one or more screens among which users can navigate to enter their customization data.

Typically, portlets in `EDIT` portlet mode will set or update portlet preferences. Refer to Chapter 19 Portlet Preferences for details on portlet preferences.

Portlet developers should implement the `EDIT` portlet mode functionality by overriding the `doEdit` method of the `GenericPortlet` class, by providing a method annotated with

[8] See Section 4.7.1 Dispatching to `GenericPortlet` Annotated Methods on page 27.
[9] See Section 4.8.4 Annotated Render Method Dispatching on page 34

`@RenderMode` in a class extending `GenericPortlet`[8], or providing a method annotated with `@RenderMethod` in a managed bean class[9].

Portlets are not required to support the `EDIT` portlet mode.

10.3 `HELP` Portlet Mode

When in `HELP` portlet mode, a portlet should provide help information about the portlet. This help information could be a simple help screen explaining the entire portlet in coherent text or it could be context-sensitive help.

Portlet developers should implement the `HELP` portlet mode functionality by overriding the `doHelp` method of the `GenericPortlet` class, by providing a method annotated with `@RenderMode` in a class extending `GenericPortlet`[8], or providing a method annotated with `@RenderMethod` in a managed bean class[9].

Portlets are not required to support the `HELP` portlet mode.

10.4 Custom Portlet Modes

Portal vendors may define custom portlet modes for vendor-specific functionality for modes that need to be managed by the portal. Portlets may define additional custom portlet modes that don't need to be managed by the portal and correspond to the `VIEW` mode from a portal point of view.

The portlet must declare portlet modes that are not managed by the portal must be marked as such in the portlet configuration. Portlet modes are considered portal managed by default.

Portlets must define the custom portlet modes they intend to use in the portlet configuration, see Section 28.1.2 Custom Portlet Mode on page 172. At deployment time, the portal managed custom portlet modes defined by the portlet should be mapped to custom portlet modes supported by the portal implementation. Portlets that list custom portlet modes that are not managed by the portal may provide a localized decoration name as resource bundle entry with the key `javax.portlet.app.custom-portlet-mode.<name>.decoration-name` for this portlet mode. If no entry in the portlet resource bundle with such a name exists, the portlet container should use the portlet mode name as default decoration name.

If a custom portlet mode defined in the portlet configuration is not mapped to a custom portlet mode provided by the portal or otherwise supported as non-managed portlet mode, the portlet must not be invoked in that portlet mode.

Appendix D Custom Portlet Modes defines a list of portlet mode names and their suggested utilization. Portals implementing these predefined custom portlet modes could do an automatic mapping when custom portlet modes with those names are defined in the deployment descriptor. Therefore providing a decoration name or `portal-managed` element for the modes defined the appendix is not necessary.

10.5 Defining Portlet Modes Support

The portlet must declare the supported portlet modes for each markup type they support in the `render` method. As all portlets must support the `VIEW` portlet mode, `VIEW` does not have to be indicated. The portlet must not be invoked in a portlet mode that has not been declared as supported for a given markup type.

The portlet container must ignore all references to custom portlet modes that are not supported by the portal implementation, or that have no mapping to portlet modes supported by the portal.

10.6Setting next possible Portlet Modes

Via the render response the portlet can set next possible portlet modes that make sense from the portlet point of view. If set, the portal should honor this enumeration of portlet modes and only provide the end user with choices to the provided portlet modes or a subset of these modes based on access control considerations. If the portlet does not set any next possible portlet modes the default is that all supported portlet modes that the portlet has defined are considered to be candidate new portlet modes.

To ensure that the next possible portlet modes are honored by all portal implementations, the portlet should set the `javax.portlet.renderHeaders` container runtime option and either overwrite the `GenericPortlet.getNextPossiblePortletModes` method or set the next possible portlet modes in the `RENDER_HEADERS` sub-phase of the render phase (see Section 4.7.6 Render Dispatching) via `setNextPossiblePortletModes`. Doing so ensures that the portal receives these suggested new modes before writing the portlet window decorations and thus is able to optimize the amount of buffering needed.

Chapter 11 Window States

A window state is an indicator of the amount of portal page space that will be assigned to the content generated by the portlet during rendering. When invoking a portlet, the portlet container provides the current window state to the portlet. The portlet may use the window state to decide how much information it should render. Portlets can programmatically change their window state during the action phase.

The Portlet Specification defines three window states - `NORMAL`, `MAXIMIZED and MINIMIZED`. The `WindowState` class defines constants for these window states.

11.1 `NORMAL` Window State

The `NORMAL` window state indicates that a portlet may be sharing the page with other portlets. It may also indicate that the target device has limited display capabilities. Therefore, a portlet should restrict the size of its rendered output in this window state.

11.2 `MAXIMIZED` Window State

The `MAXIMIZED` window state is an indication that a portlet may be the only portlet being rendered in the portal page, or that the portlet has more space compared to other portlets in the portal page. A portlet may generate richer content when its window state is `MAXIMIZED`.

11.3 `MINIMIZED` Window State

When a portlet is in `MINIMIZED` window state, the portlet should only render minimal output or no output at all.

11.4 Custom Window States

Portal vendors may define custom window states.

Portlets can only use window states that are defined by the portal. Portlets must define the custom window states they intend to use in the in the portlet configuration. At deployment time, the custom window states defined in the configuration should be mapped to custom window states supported by the portal implementation.

If a custom window state defined in the configuration is not mapped to a custom window state provided by the portal, portlets must not be invoked in that window state.

11.5 Defining Window State Support

Portlets may specify the custom window states they can handle for each markup type they support in the `render` method through the configuration. If the portlet does not list explicitly which window states it supports, the portal / portlet container should assume that the portlet supports all pre-defined window states and all custom window states defined for this portlet application.

As all portlets must at least support the pre-defined window states `NORMAL`, `MAXIMIZED`, `MINIMIZED`, these window states do not have to be indicated. The portlet should not be invoked in a custom window state that has not been declared as supported for a given markup type.

The portlet container must ignore all references to custom window states that are not supported by the portal implementation, or that have no mapping to window states supported by the portal.

Chapter 12 Portlet Parameters

The `PortletParameters` and `MutablePortletParameters` interfaces define the API for accessing the parameters that are set for the portlet or on a portlet URL. Portlet parameters store state information that the portlet needs to render itself, generate content by serving resources, or make decisions when executing portlet actions.

Conceptually the portlet parameters correspond to query string parameters that are stored in the URL used to access the portlet, although they are not required to actually be present on the URL as visible parameters.

The Portlet Specification distinguishes between different types of portlet parameters according to their use.

- **Render Parameters** are set on the response during the Action and Event phases to govern content generation during the Render and Resource phases. They are also set on render URLs to move the portlet to a new render state when the URL is triggered.

  Render parameters can always be read from the request object during request processing. However, they can only be changed during the action phase or when a render URL containing different render parameter values is activated.

  Private render parameters are available exclusively to a single portlet. Public render parameters can be shared between portlets.

  Example: Render URLs with differing render parameters can be used to implement tabbed navigation within a portlet.

- **Resource Parameters** provide additional information about the content to be generated when serving a resource for the governing render state. They are set on resource URLs and made available to the portlet through the resource request when the URL is triggered.

  Example: Portlets may require several different pieces of content to be served for the governing render state. Resource URLs with differing resource parameters can be used to determine which content is to be served for a specific request.

- **Action Parameters** provide additional information about the action to be executed for the governing render state. They are set on action URLs and made available to the portlet through the action request when the URL is triggered, or they are provided to the portlet by the client (form parameters).

  Example: Portlets may render a number of forms for the governing render state. Action URLs with differing action parameters can be used to determine which form is submitted or which action is to be executed for a specific request.

  Example: Portlets may render forms that, when submitted, may cause parameters to be added to the portlet action request. During action request processing, these form parameters will be available as action parameters.

Portlet parameters can only be set and read in the appropriate execution phases. The Portlet Specifications defines interfaces for read-only and read-write access to the portlet parameters. The portlet container must implement these interfaces.

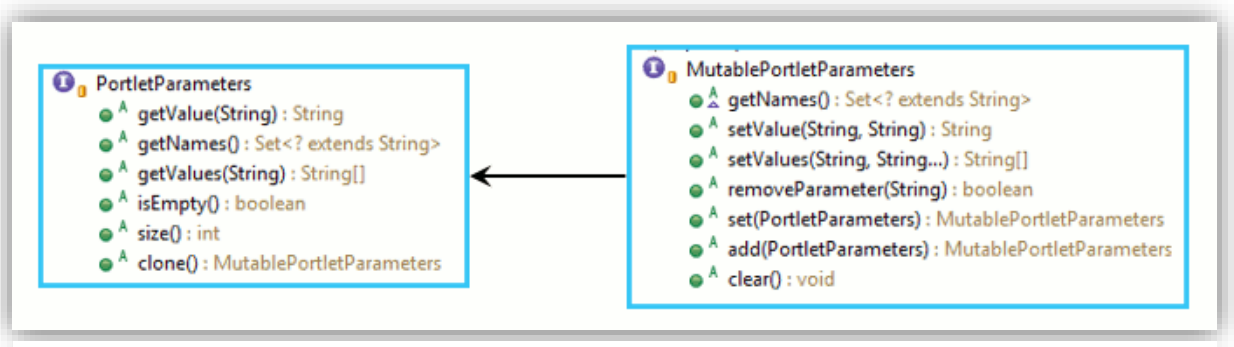


Figure 12–1 Portlet Parameters

12.1 Portlet Parameters

Portlet parameters are name-value pairs modeled after servlet request parameters. The parameter name is represented by a string while the value is a string array.

The value `null` is a valid parameter value, both within a parameter values array and when set or returned as a single value. Setting a parameter value to `null` does not remove the parameter. Similarly, an empty array is a valid parameter value.

The parameters available through the `PortletParameters` interface must be "`x-www-form-urlencoded`" decoded. The parameters set through the `MutablePortletParameters` interface must be "`x-www-form-urlencoded`" encoded by the portal or portlet container as necessary.

The portlet must not be allowed to access private parameters set by other portlets.

If portlets namespace or encode URL parameters or form parameters they are also responsible for removing the namespace. The portlet container will not remove any namespacing the portlet has done on these parameters.

12.1.1 Extra Request Parameters

The portlet container implementation may add extra parameters to portlet URLs to help the portlet container route and process client requests.

Extra parameters used by the portlet container must be invisible to the portlets receiving the request. It is the responsibility of the portlet container to properly namespace these extra parameters to avoid name collisions with parameters the portlets define.

Parameter names beginning with the "javax.portlet." prefix are reserved for definition by this specification and for use by portlet container implementations.

12.1.2 `PortletParameters` Interface

The `PortletParameters` interface provides read-only access to the parameters. It provides the following methods.

Method	Description
`getValue`	Returns a string value for the given parameter name. If the name designates a multivalued parameter, the first element of the values array is returned.
`getNames`	Returns a set of strings representing the parameter names. The set will be empty if no parameters are available.
`getValues`	Returns the values array for the given parameter name. Returns null if the parameter does not exist.
`isEmpty`	Returns `true` if the `PortletParameters` object is empty and `false` otherwise.
`size`	Returns the number of number of parameters contained in the object.
`clone`	Returns a `MutablePortletParameters` object containing the same parameters as this object. The underlying data structures are copied, so that changes to the returned object will not affect the original object.

12.1.3 `MutablePortletParameters` Interface

As shown in Figure 12–1 Portlet Parameters, the `MutablePortletParameters` interface extends the `PortletParameters` interface, adding write access to the parameters. It provides the methods below.

5 Changes made to a `MutablePortletParameters` object obtained from a portlet response or portlet URL immediately affect the underlying response or URL object. Changes made to a `MutablePortletParameters` object obtained by cloning a `PortletParameters` object only affect the object itself.

Method	Description
`getNames`	Returns a set of strings representing the parameter names. The set will be empty if no parameters are available. Parameters cannot be added using the returned set, however, removing a parameter name from the returned set will remove the parameter from the `MutablePortletParameters` object.
`setValue`	Sets the parameter to the given value. If the parameter already exists, the existing parameter will be replaced.
`setValues`	Sets the parameter to the given values array. If the parameter already exists, the existing parameter will be replaced.
`removeParameter`	Removes the given parameter.
`set`	Accepts a PortletParameters object, replacing the current parameters with the parameters contained in the given object.

Method	Description
	The objects will remain independent, so that changes to one will not affect the other.
`add`	Accepts a PortletParameters object, adding the parameters contained in the given object to the current parameters. If a parameter from the input object is already present, its value will be updated with the input value. The objects will remain independent, so that changes to one will not affect the other.
`clear`	Removes all parameters.

12.2 Render Parameters

Render parameters govern portlet output during the render and resource phases. They can be read from the request object during the render, action, or resource phases. They can be set through the `ActionResponse` or `EventResponse` during the action phase.

Render parameters can be set on render URLs created during the render or resource phases. When this is done, the new render parameter values take effect when the render URL is activated.

If a portlet receives a render request that is the result of a client request targeted to another portlet in the portal page, the parameters should be the same parameters as of the previous render request from this client.

If a portlet receives an event that is the result of a client request targeted to another portlet in the portal page, the parameters should be the same parameters as of the previous render request from this client.

If a portlet receives a render request following an action or event request as part of the same client request, the parameters received with render request must be the render parameters set during the action or event request.

If a portlet receives a render or action request that is the result of invoking a corresponding URL targeting this portlet, the render parameters received with the request must be the parameters set on the render or action URL, provided that these were not changed by the portlet as a result of a container event received for this render URL.

Portals often provide controls to change the portlet mode and the window state for the portlet. The URLs these controls use are generated by the portal. Client requests triggered by those URLs must be treated as render URLs in the sense that the existing render parameters are preserved.

12.2.1 Public Render Parameters

Public render parameters can be shared with other portlets within the same portlet application or across portlet applications. The portlet must declare public render parameters in its configuration by providing a qualified name along with an identifier. Public render parameters can be viewed and changed by other portlets or components. The portlet accesses the public render parameter through the configured identifier.

The portlet container must provide only the public render parameters specified in the portlet configuration to the portlet. The portlet container must share only those render parameters set by a portlet that are declared public in the portlet configuration.

The portlet container is free to only provide a subset of the defined public render parameters to portlets that are not target of a render URL as storing of render parameters is only encouraged, but not mandated for portal / portlet container implementations. A public render parameter that is not supplied for this request should be viewed by the portlet as having the value `null`.

If the portlet was the target of a render URL and this render URL contains a specific public render parameter, the portlet must receive at least this public render parameter.

By default all public render parameters declared by the portlet will be provided during request processing. In order to minimize updates, a portlet should only set public render parameters explicitly on a render URL if the values in the target request should be different from the parameter values of the current request.

Public render parameters can be set and removed on portlet URL and response objects using the `MutablePortletState` interface methods in the same manner as private render parameters. A portlet can use the `RenderParameters` interface `isPublic` method to determine if a given render parameter is a public render parameter.

It is up to the portal implementation to decide which portlets may share the same public render parameters. The portal should use the information provided in the configuration such as the identifier, qname, and description, in order to perform a mapping between public render parameters configured by different portlets.

It is also an implementation choice of the portal whether different portlet windows of the same portlet will receive the same public render parameter values. An example where different portlet windows may not want to share the same public render parameters is a generic viewer portlet that takes as public render parameter the news article ID to display. The user may have several viewer portlets on different pages that connect to different content systems, requiring differing public render parameters.

12.2.2 `RenderParameters` Interface

The `RenderParameters` interface extends `PortletParameters` to provide read-only access to the render parameters. It provides the following methods.

Method	Description
`clone`	Overrides the `PortletParameters` clone method to return a `MutableRenderParameters` object rather than a `MutablePortletParameters` object.
`isPublic`	Returns `true` if the given parameter name represents a public render parameter and `false` otherwise.

12.2.3 `MutableRenderParameters` Interface

The `MutableRenderParameters` interface extends `RenderParameters` and `MutablePortletParameters` to provide read-write access to the render parameters. It provides the following methods.

Method	Description
`clearPublic`	Clears all public render parameters.
`clearPrivate`	Clears all private render parameters.

12.3 Action Parameters

Action parameters can be set on an action URL. Such parameters become available to the portlet as action parameters when the action URL is activated.

Action parameters may also result through an HTML form submission. Form data is handled according to the rules defined by *Servlet Specification 3.1*[10].

If the portlet is performing an HTML Form submission via HTTP method POST, the form data will be populated to the action parameters if the form content type is `application/x-www-form-urlencoded`. If the action URL used to initiate the request contains action parameters, the URL parameters will be aggregated with the form parameters. The URL parameters are presented before the POST body data.

If the POST form data are populated to the action parameters, the post form data will no longer be available for reading directly from the request object's input stream. If the POST form data is not included in the parameter set, the post data must still be available to the portlet via the `ActionRequest` / `ResourceRequest` input stream.

If the portlet is performing an HTML form submission via the HTTP GET method, the form data set is appended to the portlet URL used for the form submission and are therefore accessible as request parameters for the portlet.

Note that some portlet container implementations may encode internal state as part of the URL query string and therefore do not support forms using the HTTP GET method.

As portlet URLs may be ECMA script functions that produce the required URL only on executing the URL the portlet should not simply add additional query parameters to a portlet URL on the client.

12.3.1 `ActionParameters` Interface

The `ActionParameters` interface extends `PortletParameters` to provide read-only access to the action parameters. It provides the following methods.

Method	Description
`clone`	Overrides the `PortletParameters` clone method to return a `MutableActionParameters` object rather than a `MutablePortletParameters` object.

12.3.2 `MutableActionParameters` Interface

The `MutableActionParameters` interface extends `ActionParameters` and `MutablePortletParameters` to provide read-write access to the action parameters. It provides no additional methods.

[10] See Servlet Specification Version 3.1, Section 3.1 HTTP Protocol Parameters

12.4 Resource Parameters

When processing resource requests, the portlet must receive any resource parameters that were explicitly set on the `ResourceURL` that triggered the request.

12.4.1 `ResourceParameters` Interface

The `ResourceParameters` interface extends `PortletParameters` to provide read-only access to the Resource parameters. It provides the following methods.

Method	Description
`clone`	Overrides the `PortletParameters` clone method to return a `MutableResourceParameters` object rather than a `MutablePortletParameters` object.

12.4.2 `MutableResourceParameters` Interface

The `MutableResourceParameters` interface extends `ResourceParameters` and `MutablePortletParameters` to provide read-write access to the Resource parameters. It provides no additional methods.

Chapter 13 Portlet State

The portlet state consists of the portlet mode, the window state, and the public and private render parameters. The portlet state controls portlet content rendering. The portal URL addressing a portal page or portlet resource associated with the page generally contains the portlet state of each portlet on the page.

The Portlet Specification provides dedicated interfaces for accessing the portlet state. These interfaces are extended by the URL, request, and response interfaces that make the portlet state available.

The portlet state can be read in any portlet request phase (in the resource phase subject to the cacheability setting), but can be written only during the action phase when processing an action or event request. The portlet state can also be set on render and action URLs created during the resource or render phases.

The `PortletState` interface provides read-only access to the portlet state. The `MutablePortletState` interface extends `PortletState` to provide additional methods for read-write access.

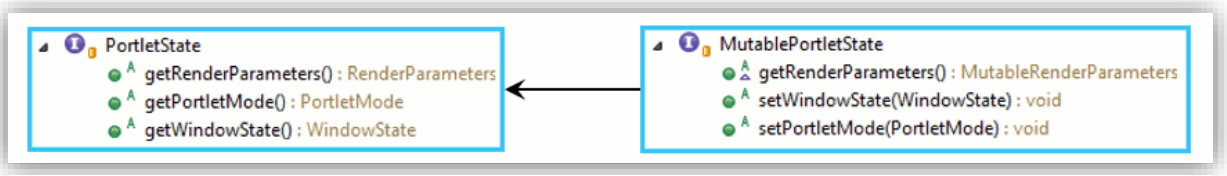


Figure 13–1 Portlet State Interfaces

13.1 `PortletState` Interface

The `PortletState` interface provides the following methods.

Method	Description
`getRenderParameters`	Returns the current `RenderParameters` object. If no render parameters are available, the object will be empty.
`getPortletMode`	Returns the current portlet mode.
`getWindowState`	Returns the current window state.

13.2 `MutablePortletState` Interface

The `PortletState` interface provides the following methods.

Method	Description
`getRenderParameters`	Overrides the superclass method to return the current `MutableRenderParameters` object. If no render parameters are available, the object will be empty.
`setPortletMode`	Sets the portlet mode. If a portlet attempts to set a portlet mode that is not available or that is disallowed for the current user, this method must throw a `PortletModeException`.
`getWindowStates`	Sets the window state. If a portlet attempts to set a window state that is not available or that is disallowed for the current user, this method must throw a `WindowStateException`.

Chapter 14 Portlet URLs

The portlet may need to add URLs referencing itself when producing markup. For example, when the portlet renders a form to be submitted, or a link to another page of data within the portlet, it requires a URL that results in a request targeted to itself so that it can carry out the appropriate action. URLs that result in requests targeted to the portlet are called portlet URLs.

The Portlet Specification provides interfaces that allow the developer to manipulate and generate portlet URLs. This chapter presents those interfaces. Creation of portlet URL objects implementing these interfaces is covered in Chapter 16 PortletResponse Interfaces.

The Portlet Specification introduces three types of portlet URL for use by developers. When these URLs are activated, they initiate execution of the three portlet request phases.

- The render URL represented by the `RenderURL` interface initiates the render phase.
- The action URL represented by the `ActionURL` interface initiates the action phase.
- The resource URL represented by the `ResourceURL` interface initiates the resource phase.

The Portlet Specification introduces the additional interfaces `BaseURL` and `PortletURL` in order to aggregate common functionality. The developer uses these interfaces indirectly. The following figure illustrates the relationship between the portlet URL interfaces.

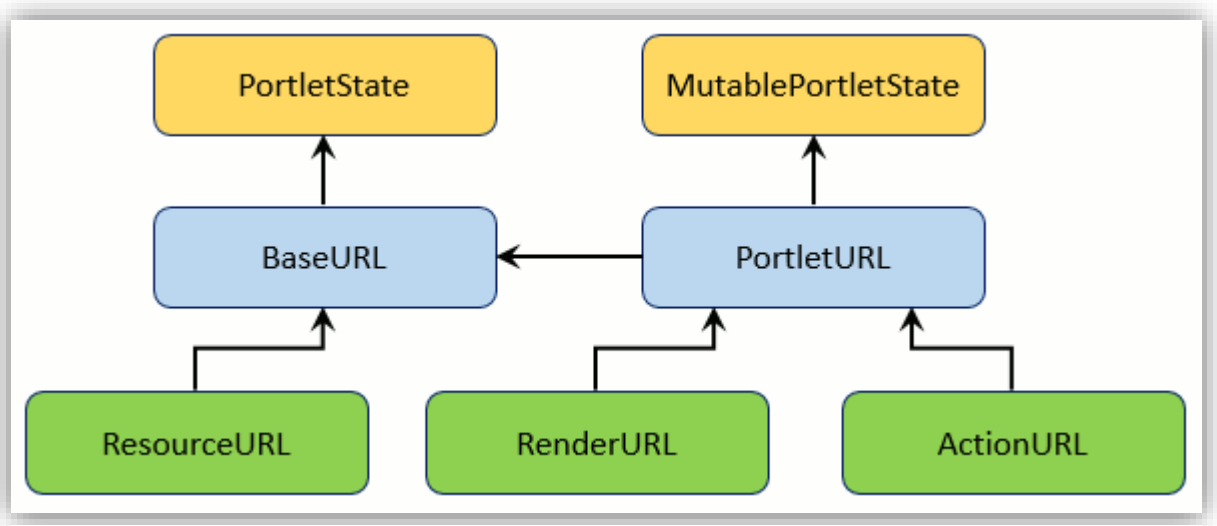


Figure 14–1 The Portlet URL Interfaces

The `BaseURL` interface provides read-only access to the portlet state along with other common functionality. The `ResourceURL` interface extends `BaseURL` as the resource URL is tied to a specific portlet state. The `PortletURL` interface extends `MutablePortletState`, adding the ability to change the portlet state, and `BaseURL`. The `RenderURL` interface extends `PortletURL` to initiate rendering, while `ActionURL` extends `PortletURL` to trigger a portlet action.

Note that portlet URLs are only valid within the current request and need to be either written to the output stream in order to allow re-writing the portlet URL token into a real URL.

14.1 The Base URL

The `BaseURL` interface provides methods that are common for all URLs targeting the portlet.

The BaseURL interface extends the PortletState interface to provide access to the render parameters, portlet mode, and window state.

The `toString` method converts the URL to string form. The `append` method appends the URL to an `Appendable` object such as a `StringBuilder`. The `write` method writes output directly to the output stream. If the portlet wants to include a portlet URL in the portlet content it can use the `write` method to avoid the string object creation overhead associated with the `toString` method.

Portlet developers should be aware that the string representation of a portlet URL may not be a well formed URL but may be a special token at the time the portlet is generating its content. Portal servers often use a technique called URL rewriting that post-processes the content in order to resolve portlet URL tokens into real URLs. The portal may even render an ECMA script function to generate the URL when the user clicks on the link.

Properties can be used by portlets to set vendor specific information on the `PortletURL` object and thus use extended URL capabilities. A portlet can set properties using the following `setProperty` and `addProperty` methods of the `BaseURL` interface.

The `setProperty` method sets a property with a given name and value. A previous property is replaced by the new property. Where a set of property values exist for the name, the values are cleared and replaced with the new value. The `addProperty` method adds a property value to the set with a given name. If there are no property values already associated with the name, a new property is created.

The `setSecure` method allows a portlet to indicate if the portlet URL has to be a secure URL or not (i.e. HTTPS or HTTP). If the `setSecure` method is not used, the portlet URL should be of the same security level of the current request. If `setSecure` is called with `true`, the transport for the request triggered with this URL must be secure (i.e. HTTPS). If set to `false`, the portlet indicates that it does not require a secure connection for the request triggered with such a URL.

The `setAuthentication` method allows a portlet to indicate if accessing the URL will require authentication. If this method is not used, or if authentication is set to `false` using this method, authentication will be allowed, but not required.

The `getAuthentication` method allows the current authentication setting to be retrieved.

14.1.1 `BaseURL` Interface

The `BaseURL` interface provides the following methods.

Method	Version	Description
`setParameter(String, String)`	2.0	Deprecated. Behaves as described in JSR 286 Portlet Specification 2.0.
`setParameter(String, String...)`	2.0	Deprecated. Behaves as described in JSR 286 Portlet Specification 2.0.
`setParameters(Map<String, String[]>)`	2.0	Deprecated. Behaves as described in JSR 286 Portlet Specification 2.0.

Method	Version	Description
`getParameterMap()`	2.0	Deprecated. Behaves as described in JSR 286 Portlet Specification 2.0.
`setSecure(boolean)`	2.0	If set to `true`, requests secure transmission.
`setAuthenticated(boolean)`	3.0	If set to `true`, user authentication will be required for this URL.
`getAuthenticated()`	3.0	Returns `true` if user authentication is required for this URL.
`toString()`	2.0	Returns a string representation of the URL.
`write(Writer)`	2.0	Writes the portlet URL to the output stream. The URL written to the output stream is always XML escaped.
`write(Writer, boolean)`	2.0	Writes the portlet URL to the output stream. The URL written to the output stream is XML escaped if the `boolean` argument is set to `true`.
`append(Appendable)`	3.0	Appends the portlet URL to the given `Appendable` object. The appended URL is always XML escaped.
`append(Appendable, boolean)`	3.0	Appends the portlet URL to the given Appendable object. The appended URL is XML escaped if the `boolean` argument is set to `true`.
`addProperty(String, String)`	2.0	Adds a String property to an existing key on the URL. This method allows URL properties to have multiple values.
`setProperty(String, String)`	2.0	Sets a String property on the URL. This method resets all properties previously added with the same key.

14.2 The Resource URL

A resource URL triggers a resource request that allows the portlet serving resources with access to information of the portlet request. The portlet has full control over the output stream and can render binary markup when serving resources.

5 A resource ID string can be attached to the resource URL using the `setResourceID` method. The resource ID is made available to the portlet during resource request processing. The portlet can query the resource ID using the `getResourceID` method.

The portlet can add additional resource parameters to the resource URL using the `getResourceParameters` method. Changes made to the `MutableResourceParameters`

object returned by this method take effect on the resource URL immediately. Resource parameters are only made available during the resource request triggered by the resource URL.

Resource parameters can be used to differentiate between multiple resource URLs generated during the same portlet request processing phase. They are not affected by the resource URL cacheability setting.

The resource URL is tied to the portlet state governing the render or resource phase during which it is created. The portlet state on a resource URL cannot be modified. However, depending on the cacheability setting, portlet state information can be excluded from the URL.

The portlet can set the cacheability level for a resource URL using the `setCacheability` method. The portlet can query the cacheability setting using the `getCacheability` method.

A portal typically requires the portlet state of all portlets on the page to create portlet URLs. However, the more state is attached to the URL, the less cacheable the content addressed by the URL. In order to allow resources to be cached to the greatest extent possible while still allowing creation of portlet URLs when necessary, the resource URL cacheability setting was introduced. In order of decreasing cacheability, the three cacheability settings follow:

- FULL – The resource URL contains no portlet state information.

  If the resource URL is generated within a resource request triggered by a resource URL with cacheability set to FULL, only URLs with a cache level FULL can be created. The same restriction is true for all downstream URLs that result from this serveResource call. Setting a cacheability different from FULL on a resource URL created during such a request must result in an IllegalStateException. Attempts to create URLs that are not of type FULL or are not resource URLs in the current or a downstream response must result in an IllegalStateException.

  URLs of the type FULL have the highest cacheability in the browser as they do not depend on any state of the portlet or page.

- PORTLET – The resource URL contains only the portlet state of the targeted portlet.

  If the resource URL is generated within a resource request triggered by a resource URL with cacheability set to PORTLET, only URLs with a cache level FULL or PORTLET can be created. The same restriction is true for all downstream URLs that result from this serveResource call. Setting a cacheability different from FULL on a resource URL created during such a request must result in an IllegalStateException. Attempts to create URLs that are not of type FULL or are not resource URLs in the current or a downstream response must result in an IllegalStateException.

  URLs of the type PORTLET are cacheable on the portlet level in the browser and can be served from the browser cache for as long as the state of this portlet does not change.

- PAGE – The resource URL contains the portlet state of all portlets on the page.

  The markup returned by a resource request triggered through such a resource URL may contain any portlet URL.

  Resource URLs of the type PAGE are only cacheable on the page level and can only be served from the browser cache as long as no state on the page changes.

If no cacheability option is set on the resource URL, the cacheability setting of the parent resource is used. If no parent resource is available, PAGE is the default.

As an example assume that a portlet creates a resource URL with cacheability PORTLET during the render phase. When this resource URL is triggered and the portlet resource phase is

executed, all resource URLs created during the resource request will have the PORTLET cacheability setting by default. The portlet can only leave the PORTLET cacheability setting or make it more cacheable by setting it to FULL, but cannot make it less cacheable by setting it to PAGE.

14.2.1 `ResourceURL` Interface

The `ResourceURL` interface provides the following methods.

Method	Version	Description
`PORTLET`	2.0	String constant indicating cacheability level PORTLET
`PAGE`	2.0	String constant indicating cacheability level PAGE
`SHARED`	2.0	String constant to be used with the URL setProperty method to indicate that the resource can be shared
`getResourceParameters()`	3.0	Returns a `MutableResourceParameters` object. Parameter changes made through this object take effect on the resource URL immediately.
`setResourceID(String)`	2.0	Sets the resource ID
`getResourceID()`	2.0	Returns the currently set resource ID
`getCacheability()`	2.0	Returns the current cacheability setting
`setCacheability(String)`	2.0	Sets the cacheability

14.3 The Portlet URL

The `PortletURL` interface extends `BaseURL` to obtain common functionality and extends `MutablePortletState` to obtain methods to set the portlet state (window state, portlet mode, and render parameters).

When the portlet mode is set on the URL using the `setPortletMode` method, the change of portlet mode must be effective for the request triggered by the portlet URL. There are some exceptional circumstances, such as changes in access control privileges that could prevent the portlet mode change from happening. If the portlet mode is not explicitly set on a URL, the URL must have same the portlet mode as the current request.

When the window state is set on the URL using the `setWindowState` method, the change of window state should be effective for the request triggered by the portlet URL. The portlet should not assume that the request triggered by the portlet URL will be in the window state set as the portlet container could override the window state because of implementation dependencies between portlet modes and window states. If the window state is not explicitly set on a URL, the URL must have same the window state as the current request.

The portal/portlet container must ensure that all render parameters set on the portlet URL through the `MutableRenderParameters` interface methods become render parameters on subsequent requests resulting from URL activation.

The `PortletURL` interface `setBeanParameter(PortletSerializable)` method sets the given `@PortletStateScoped` managed bean state on the URL. A `@PortletStateScoped` managed bean must implement the `PortletSerializable` interface. For a given portlet, a `@PortletStateScoped` bean is uniquely identified by its bean class, since the bean may not be further qualified. The values array obtained through the `PortletSerializable` interface `serialize` method is stored on the URL as a render parameter under the render parameter name associated with the bean. See Section 21.2.2 Portlet State Scope for further information.

14.3.1 `PortletURL` Interface

The `PortletURL` interface provides the following methods.

Method	Version	Description
`setBeanParameter`	3.0	Sets the given `@PortletStateScoped` managed bean state on the URL.
`removePublicRenderParameter`	2.0	Deprecated. Behaves as described in JSR 286 Portlet Specification 2.0.

14.4 The Render URL

A render URL triggers portlet render phase execution. The `RenderURL` interface extends `PortletURL` to allow read-write access to the portlet state and to obtain the base portlet URL functionality.

Render URLs should only be used for idempotent tasks, i.e. tasks that do not change server state from the portlet perspective. Content provided through Render URLs used in this manner can become cacheable.

Error conditions, cache expirations, and changes of external data may affect the content generated by a portlet as result of a request triggered by a render URL.

Render URLs should be accessed using the HTTP GET method as the results of their invocation should not change any state on the server. As a consequence, it may be possible to bookmark render URLs. Render URLs should not be used for form submission.

The portlet can set a fragment identifier on a render URL. The fragment identifier consists of additional information appended to the URL after a '#' character. A URL can have only a single fragment identifier. The fragment identifier must be formed according to rfc3986 "Uniform Resource Identifier (URI): Generic Syntax".

The fragment identifier is often used to address a named anchor such as <a name="#fragmentIdentifier">, but it can also be used for other purposes such as to provide additional information for JavaScript routines on the client.

If the fragment identifier is not specified by the portlet, the portal implementation can optionally append a fragment identifier to the URL.

The `setFragmentIdentifier` method allows a fragment identifier to be appended to a render URL. The fragment identifier appended with this method will not be namespaced. The portlet

is responsible for performing any required namespacing. However, the fragment identifier string will be escaped as necessary.

Setting the fragment identifier to null will remove a fragment identifier that was previously set using this method. Setting the fragment identifier to the empty string will create an empty fragment identifier.

The `getFragmentIdentifier` method retrieves a fragment identifier previously set through `setFragmentIdentifier`.

14.4.1 `RenderURL` Interface

The `RenderURL` interface provides the following methods.

Method	Version	Description
`setFragmentIdentifier`	3.0	Sets the fragment identifier
`getFragmentIdentifier`	3.0	Queries the fragment identifier

14.5 The Action URL

An action URL triggers portlet action phase execution. The `ActionURL` interface extends `PortletURL` to allow read-write access to the portlet state and to obtain the base portlet URL functionality.

Action URLs are intended to be used for non-idempotent tasks, i.e. tasks that change server state. Action URLs are often used for form submission. Action URLs are generally accessed using the HTTP POST method, and by virtue of that, the content returned by a request initiated through an action URL is generally not cacheable.

The portlet can add additional action parameters to the action URL using the `getActionParameters` method. Changes made to the `MutableActionParameters` object returned by this method take effect on the resource URL immediately. Action parameters are only made available during the action request triggered by the action URL.

Action parameters can be used to differentiate between multiple action URLs generated during the same portlet request processing phase.

14.5.1 `ActionURL` Interface

The `ActionURL` interface provides the following methods.

Method	Version	Description
`getActionParameters()`	3.0	Returns a `MutableActionParameters` object. Parameter changes made through this object take effect on the action URL immediately.

14.6 The Portlet URL Generation Listener

Portlets can register portlet URL generation listeners to filter URLs before they are generated using the `BaseURL` `toString`, `write`, or `append` methods. The portlet URL generation listener

is also called for a render URL that is added to a redirect URL through the `ActionResponse.sendRedirect(location, renderUrlParamName)` method.

For example the portlet could use a portlet URL generation listener to set the cacheability of resource URLs in one central piece of code.

A portlet URL generation listener can be configured either through the deployment descriptor or by using the `@PortletURLGenerationListener` annotation.

14.6.1 Configuration through the Deployment Descriptor

In order to receive a callback from the portlet container before a portlet URL is generated the listener class needs to implement the `PortletURLGenerationListener` interface and register it in the deployment descriptor.

Portlet applications must register Portlet URL listeners in the portlet deployment descriptor under the application section with the `listener` element and provide the class name that implements the `PortletURLGenerationListener` as value in the `listener-class` element.

If more than one listener is registered, the portlet container must chain the listeners in the order of appearance in the deployment descriptor.

14.6.1.1 `PortletURLGenerationListener` Interface

The `PortletURLGenerationListener` interface provides callbacks for each portlet URL type. If the portlet application has specified one or more `PortletURLGenerationListener` classes in the portlet deployment descriptor, the portlet container must call:

- The `filterActionURL` method for all action URLs before executing the `write`, `append`, or `toString` method of these action URLs.
- The `filterRenderURL` method for all render URLs before executing the `write`, `append`, or `toString` method of these render URLs.
- The `filterResourceURL` method for all resource URLs before executing the `write`, `append`, or `toString` method of these resource URLs.

The portlet container must provide the `PortletURL` or `ResourceURL` to generate to the filter methods and execute the `write` or `toString` method on the updated `PortletURL` or `ResourceURL` that is the outcome of the filter method call.

14.6.2 Configuration through Annotation

The `@PortletURLGenerationListener` annotation designates a portlet URL generation listener method. The listener method may be located in any valid CDI managed bean class provided by the portlet.

The listener method will be invoked before a URL of the corresponding type is generated through the `BaseURL` `toString`, `append`, or `write` methods.

The annotated method must have one of the following signatures:

Action URL	`public void <methodName>(ActionURL actionURL)`
Render URL	`public void <methodName>(RenderURL renderURL)`
Resource URL	`public void <methodName>(ResourceURL resourceURL)`

The method name can be freely selected.

If the `@PortletURLGenerationListener` annotation is applied to a method that does not meet the method signature requirement, the portlet container must not place the portlet in service. The appropriate error handling and message display is left as a portal implementation detail.

If more than one method is annotated for a given URL type, the order of execution is determined by the `ordinal` element within the @PortletURLGenerationListener annotation. Annotated methods with a lower ordinal number are executed before methods with a higher ordinal number. If two annotated methods have the same ordinal number, both methods will be executed, but the execution order will be undetermined.

Portlets should generally configure portlet URL generation listeners either exclusively through the deployment descriptor or exclusively through annotations. If portlet URL generation listeners are configured through both means, the annotated portlet URL generation listener methods will be executed before the listeners configured through the deployment descriptor.

The annotated listener method can apply to multiple portlets within the portlet application. The names of the portlets for which the listener applies must be specified in the `@PortletURLGenerationListener portletNames` element. A wildcard character '*' can be specified in the first `portletName` array element to indicate that the listener is to apply to all portlets in the portlet application. If specified, the wildcard character must appear alone in the first array element.

The @PortletURLGenerationListener annotation contains the following elements.

Element	Description
`portletNames`	The portlet names for which the listener applies.
`ordinal`	The ordinal number for this annotated method.
`description`	The locale-specific description for tool use
`displayName`	The locale-specific display name for tool use

Chapter 15 Portlet Request Interfaces

Portlet request phases were introduced in Section 3.7 Portlet Request Processing and explained in detail in Chapter 4 Portlet Lifecycle Interfaces.

The request objects implement corresponding portlet request interfaces to encapsulate all information about the client request, parameters, request content data, portlet mode, window state, etc. The request object is passed to the portlet `processAction`, `processEvent`, `serveResource`, `renderHeaders`, and `render` methods. It is also explicitly or implicitly available during extended annotation-based method dispatching.

The Portlet Specification introduces five portlet request interfaces for direct use by developers.

- The `RenderRequest` provides data for header request processing.
- The `RenderRequest` provides data for render request processing.
- The `ActionRequest` provides data for action request processing.
- The `EventRequest` provides data for event request processing.
- The `ResourceRequest` provides data for resource request processing.

The Portlet Specification introduces the additional interfaces `PortletRequest` and `ClientDataRequest` in order to aggregate common functionality. The developer uses these interfaces indirectly. The following figure illustrates the relationship between the portlet request interfaces.

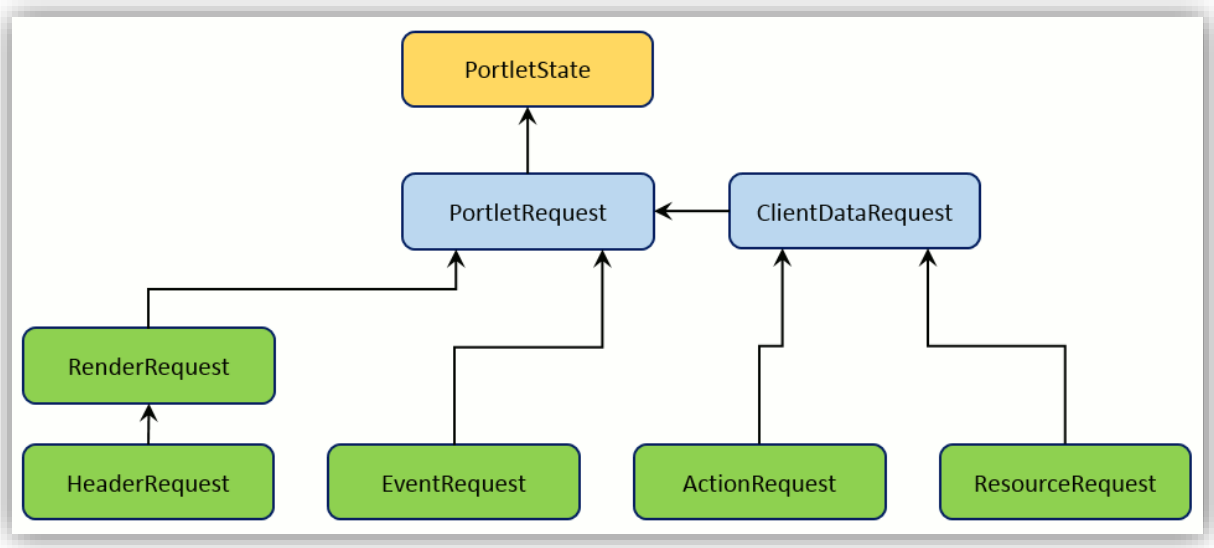


Figure 15–1 Portlet Request Interfaces

15.1 `PortletRequest` Interface

The `PortletRequest` interface at the root of the portlet request interface hierarchy provides read-only access to the portlet state along with other common functionality.

15.1.1 Version 2.0 Parameter Handling

If a portlet with a version 2.0 or earlier deployment descriptor is deployed, the portlet container must provide behavior described in this section in order to assure backward compatibility. For version 3.0 or later portlets, the behavior described in this section is to be disregarded.

The portlet container must not propagate parameters received in an action or event request to subsequent render requests of the portlet. The portlet container must not propagate parameters received in an action to subsequent event requests of the portlet.

If a portlet wants to do that in either the processAction or processEvent methods, it must use the setRenderParameter or setRenderParameters methods of the StateAwareResponse object within the processAction or processEvent call. The set render parameters must be provided to the processEvent and render calls of at least the current client request.

15.1.2 Request Attributes

Request attributes are objects associated with a portlet during a single portlet request. Requests attributes are removed at the end of a request processing phase. Request attributes may be set by the portlet or the portlet container to express information that otherwise could not be expressed via the API. Request attributes can be used to share information with a servlet or JSP included through the `PortletRequestDispatcher`.

Attributes are set, obtained, and removed using the following `PortletRequest` methods:

- `getAttribute`
- `getAttributeNames`
- `setAttribute`
- `removeAttribute`

Only one attribute value may be associated with an attribute name.

Attribute names beginning with the "`javax.portlet.`" prefix are reserved for definition by this specification. It is suggested that all attributes placed into the attribute set be named in accordance with the reverse domain name convention suggested by the Java Programming Language Specification 1 for package naming.

15.1.2.1 The User Information Request Attribute

Portlets can obtain an unmodifiable `Map` object containing the user attributes of the user associated with the current request from the request attributes. The `Map` object can be retrieved using the `USER_INFO` constant defined in the `PortletRequest` interface.

If the request is done in the context of an unauthenticated user, the `getAttribute` method with the `USER_INFO` constant must return `null`.. If the user is authenticated and there are no user attributes available, the `Map` must be an empty `Map`.

The `Map` object must contain a `String` name-value pair for each available user attribute. The `Map` object should only contain the user attributes that have been configured for the portlet. See Section 28.1.4 User Attribute on page 173.

An example of a portlet retrieving user attributes would be:

```
...
Map userInfo = (Map) request.getAttribute(PortletRequest.USER_INFO);
String givenName = (userInfo!=null)
      ? (String) userInfo.get(PortletRequest.P3PUserInfos.USER_NAME_GIVEN) :
"";
String lastName  = (userInfo!=null) ?
   (String) userInfo.get(PortletRequest.P3PUserInfos.USER_NAME_FAMILY) : "";
...
```

15.1.2.2 The CC/PP Request Attribute

The portlet can access a Composite Capability/Preference Profile[11] `javax.ccpp.Profile` object[12] using the request attribute `PortletRequest.CCPP_PROFILE`. The `PortletRequest.CCPP_PROFILE` request attribute must return a `javax.ccpp.Profile` based on the current portlet request. It may contain additional CC/PP information set by the portlet container.

15.1.2.3 The Render Part Request Attribute

If a portlet with a version 2.0 or earlier deployment descriptor is deployed, the portlet container must provide behavior described in this section in order to assure backward compatibility. For version 3.0 or later portlets, the behavior described in this section is to be disregarded.

If the `RENDER_PART` portlet request attribute is set, it indicates that the render request will be processed twice in order to allow portlets running on streaming portals to set header information and document `HEAD` section data.

1. During the first render request execution, the `RENDER_PART` request attribute is set to the value `RENDER_HEADERS`. This execution is performed before the underlying servlet response is committed. During this request execution, the portlet should only set the header-related data, cookies, markup for the document `HEAD` section, the next possible portlet modes, and the portlet title. The portlet can set cache information for this response that may differ from the one set on the RENDER_MARKUP response.
2. During the second render request execution, the `RENDER_PART` request attribute is set to the value `RENDER_MARKUP`. The portlet should produce its markup during this execution.

Non-streaming portals will not set this attribute and thus the portlet should set all necessary headers and produce markup in a single render request.

If the `javax.portlet.renderHeaders` container runtime setting is set to false, the `RenderRequest.RENDER_PART` request attribute should not be set.

The GenericPortlet class provides support for the RENDER_PART request attribute. See Section 4.7.6 Render Dispatching.

Portlets making use of the extended annotation-based dispatching mechanism (see Section 4.8 Extended Annotation-Based Dispatching) are not affected by the RENDER_PART attribute.

[11] See W3C: Composite Capability/Preference Profiles (CC/PP): Structure and Vocabularies, http://www.w3.org/TR/2001/WD-CCPP-struct-vocab-20010315/

[12] See JSR 188 CC/PP Processing, http://jcp.org/en/jsr/detail?id=188, for more details on CC/PP profile processing.

15.1.2.4 The Lifecycle Phase Request Attribute

The `LIFECYCLE_PHASE` request attribute of the `PortletRequest` interface allows a portlet to determine the current lifecycle phase of this request. This attribute value must be `ACTION_PHASE` if the current request is of type `ActionRequest`, `EVENT_PHASE` if the current request is of type EventRequest, `HEADER_PHASE` if the current request is of type `HeaderRequest`, `RENDER_PHASE` if the current request is of type `RenderRequest`, and `RESOURCE_SERVING_PHASE` if the current request is of type `ResourceRequest`.

The main intent of this attribute is to allow frameworks implemented on top of the Java Portlet Specification to perform the correct type casts from the `PortletRequest/PortletResponse` to a specific request/response pair, like `ActionRequest/ActionResponse`.

15.1.2.5 Action-scoped Request Attributes

The Java Portlet Specification follows a model of separating concerns into different request processing phases, such as the action phase, the event phase, and the render phase.. This provides a clean separation of the action semantics from the rendering of the content, however, it may create some issues with servlet-based applications that don't follow this strict Model-View-Controller pattern. Such applications in some cases assume that attributes that they set in the action phase will be accessible again when starting the rendering. The Java Portlet Specification provides the render parameters for such use cases, but some applications need to transport complex objects instead of strings.

For such use cases the Java Portlet Specification provides the action-scoped request attributes as container runtime option with the intent to provide portlets with these request attributes until a new action occurs.

Section 9.4.4 Runtime Option javax.portlet.actionScopedRequestAttributes on page 54 describes this option in more detail.

15.1.2.6 The Page State Request Attribute

The partial action processing sequence provides support for infrastructure components such as a JSF Portlet Bridge to obtain page state information for use by the JavaScript Portlet Hub component, see Section 22.3.5 Partial Action. This processing sequence requires the resource phase to follow the action phase to allow POST-based framework components such as the JSF Portlet Bridge to obtain markup data in the response to a partial action request. The framework component must transmit the updated page state data to the client in order to update the portlet hub.

During resource request execution in a partial action sequence, the portlet container must set the `PAGE_STATE` request attribute on the resource request object. The `PAGE_STATE` request attribute value must be a `String` object that the framework component must transport to the client. No restrictions are placed on the content of the `PAGE_STATE` request attribute value. The value may be empty or `null`. The `PAGE_STATE String` constant has the value `"javax.portlet.pageState"`.

15.1.3 Request Properties

A portlet can access portal/portlet container specific properties and, if available, the headers of the HTTP client request through the following `PortletRequest` methods:

- `getProperty`
- `getProperties`
- `getPropertyNames`

A property with a given name can have multiple values. If the property has multiple values, the `getProperty` method returns the first property value. The `getProperties` method allows access to all the property values associated with a particular property name by returning an `Enumeration` of `String` objects.

Depending on the underlying web-server/servlet-container and the portal/portlet container implementation, client request HTTP headers may not be always available. Portlets should not rely on the presence of headers to function properly.

The portlet interfaces provide specific methods to access some information that can be transmitted as HTTP headers fields. Portlets should use the portlet request methods for retrieving such values as the portal/portlet container implementation may use other means to determine that information. This holds true for the following information in particular.

HTTP Header	Request Interface	Method
`content-length`	`ClientDataRequest`	`getContentLength`
`content-type`	`PortletRequest`	`getContentType`
`accept-language`	`PortletRequest`	`getLocale, getLocales`

15.1.4 Cookies

The portlet can access cookies provided by the current request with the `getCookies` method. The returned cookie array provides the portlet with all cookie properties.

15.1.5 Request Context Path

The `PortletRequest` interface provides the context path through the `getContextPath` method. The context path is the path prefix associated with the deployed portlet application. If the portlet application is rooted at the base of the web server URL namespace (also known as "default" context), this path must be an empty string. Otherwise, it must be the path the portlet application is rooted to, the path must start with a '/' and it must not end with a '/' character.

15.1.6 Security Attributes

The `PortletRequest` interface offers a set of methods that provide security information about the user and the connection between the user and the portal. These methods are:

- `getAuthType`
- `getRemoteUser`
- `getUserPrincipal`
- `isUserInRole`
- `isSecure`

The `getAuthType` method indicates the authentication scheme being used between the user and the portal. It may return one of the defined constants (BASIC_AUTH, DIGEST_AUTH, CERT_AUTH and FORM_AUTH) or another `String` value that represents a vendor-provided authentication type. If the user is not authenticated, the `getAuthType` method must return `null`.

The `getRemoteUser` method returns the login name of the user making this request.

The `getUserPrincipal` method returns a `java.security.Principal` object containing the name of the authenticated user.

The `isUserInRole` method indicates if an authenticated user is included in the specified logical role.

The `isSecure` method indicates if the request has been transmitted over a secure protocol such as HTTPS.

15.1.7 Response Content Types

The `PortletRequest` interface `getResponseContentType` method returns a string representing the default content type the portlet container assumes for the output. The `getResponseContentTypes` method returns all of the content types supported by the portlet container for the request and must be a subset of the supported content types declared in the portlet configuration. The returned `Enumeration` of strings should contain the content types the portlet container supports in order of preference. The first element of the enumeration must be the same content type returned by the `getResponseContentType` method.

The values returned by the g`etResponseContentType` and `getResponseContentTypes` methods must be the same for action, event, and render request processing occurring within the same client request.

The portlet may declare supported content types in the portlet configuration using wildcards.

If a portlet defines support for all content types using a wildcard and the portlet container supports all content types, the `getResponseContentType` may return the wildcard or the content type preferred by the portlet container.

If the `getResponseContentType` or `getResponseContentTypes` methods are exposed through the `ActionRequest`, `EventRequest`, or `RenderRequest` interfaces, the following additional restrictions apply:

- The content type must include only the MIME type, not the character set. The character set of the response can be retrieved using the `RenderResponse` interface `getCharacterEncoding` method.
- The `getResponseContentTypes` method must return only the content types supported by the current portlet mode.

If the `getResponseContentType` or `getResponseContentTypes` methods are exposed through the `ResourceRequest` interface, the return values should be based on the HTTP `Accept` header provided by the client.

15.1.8 Internationalization

The `PortletRequest` interface `getLocale` method returns the preferred locale for the response as determined by the portlet container. The portlet container may use the `Accept-Language` header along with other information to make the determination. The `getLocales` method returns an Enumeration of `Locale` objects indicating, in decreasing order of preference, the locales in which the portlet container will accept content for this request.

15.1.9 Portlet Mode

The `PortletState` interface `getPortletMode` method provides the current portlet mode. A portlet may be restricted to work with a subset of the portlet modes supported by the portlet container. A portlet can use the `PortletRequest` interface `isPortletModeAllowed` method to determine if the portlet is allowed to use a portlet mode. A portlet mode is not allowed if the portlet mode is not defined in the portlet configuration or if the available portlet modes for the

portlet or for the user have been constrained further by the portal. Note that the `VIEW` mode is always allowed, even if not explicitly configured by the portlet.

15.1.10 Window State

The `PortletState` interface getWindowState method provides the current window state. A portlet may be restricted to work with a subset of the window states supported by the portlet container. A portlet can use the `PortletRequest` interface `isWindowStateAllowed` method to determine if the portlet is allowed to use a window state.

15.1.11 Access to the Portlet Window ID

The `PortletRequest` interface `getWindowID` method provides the current portlet window ID. The portlet window ID must be unique for the portlet window and constant for the lifetime of the portlet window. The portlet container must use the window ID this method returns for scoping the portlet-scope session attributes. The portlet window ID must not contain a '?' character in order to comply with the portlet scope session ID requirements (see Section 20.4 Binding Attributes to a Portlet Session).

15.1.12 Deprecated Methods

The following `PortletRequest` interface methods have been deprecated with Portlet Specification Version 3.0.

- `getParameter`
- `getParameterValues`
- `getParameterNames`
- `getParameterMap`
- `getPrivateParameterMap`
- `getPublicParameterMap`

15.2 `ClientDataRequest` Interface

The `ClientDataRequest` interface extends the `PortletRequest` interface to provide additional information about the underlying HTTP request, such as access to the input stream.

15.2.1 Retrieving Uploaded Data

The `ClientDataRequest` interface `getPortletInputStream` method returns the input stream. The portlet can use the input stream to read data when the client request contains HTTP POST data of a type other than `application/x-www-form-urlencoded`. For example, this might be the case when a file is uploaded to the portlet as part of a user interaction.

As a convenience to the portlet developer, the `ClientDataRequest` interface also provides a `getReader` method that retrieves the HTTP POST data as character data according to the character encoding defined in the request.

Only one of the two methods, `getPortletInputStream` or `getReader`, can be used during a single request phase. If the portlet obtains an input stream, a subsequent call to `getReader` must throw an `IllegalStateException`. Similarly, if the reader is obtained, a call to the `getPortletInputStream` must throw an `IllegalStateException`.

To help manage the input stream, the `ClientDataRequest` interface also provides the following methods:

- getContentType
- getCharacterEncoding
- setCharacterEncoding
- getContentLength

The setCharacterEncoding method sets the character set for the Reader returned by the getReader method and must be called prior to reading input using getReader or getPortletInputStream.

If the HTTP POST body data is of type application/x-www-form-urlencoded, it will have been already processed by the portlet container and will be available as request parameters. The getPortletInputStream and getReader methods must throw an IllegalStateException in this case.

15.3 ActionRequest Interface

The ActionRequest interface extends the ClientDataRequest interface for use during action request processing.

The ActionRequest interface getActionParameters method returns the action parameters for the request, see Section 12.3 Action Parameters. It also defines the ACTION_NAME constant that can be used together with the @ProcessAction and @ActionMethod annotations.

The PortletState interface getRenderParameters method must return the render parameters that governed the request in which the action URL was created along with any changes made to the render parameters on the action URL.

15.4 ResourceRequest Interface

The ResourceRequest interface extends the ClientDataRequest interface for use during resource request processing.

The ResourceRequest interface getResourceParameters method returns the resource parameters for the request, see Section 12.4 Resource Parameters.

If the cacheability level of that resource URL (see Section 14.2 The Resource URL) is set to PORTLET or PAGE, the PortletState interface getRenderParameters method must return the render parameters that governed the request in which the resource URL was created. Otherwise, the getRenderParameters method must return an empty RenderParameters object.

The PortletState interface getPortletMode and getWindowState methods return the current portlet mode and window state, respectively.

The ResourceRequest interface defines the ETAG constant and the getETag method for validation based caching as well as the getResourceID method that returns the resource ID set on the resource URL.

15.5 EventRequest Interface

The EventRequest interface extends the PortletRequest interface and is used during event request processing.

The EventRequest interface getEvent method returns the Event object that triggered event processing. The Event object provides the event QName via getQName, the event local name through the getName method, and the event payload through the getValue method.

The `EventRequest` interface `getMethod` method returns the name of the HTTP method with which the original action request was made, for example `POST`, or `PUT`.

The `PortletState` interface `getRenderParameters` method must return the render parameters that governed at the end of the last action or render request for the portlet.

15.6 `RenderRequest` Interface

The `RenderRequest` interface extends the `PortletRequest` interface and is used during render request processing.

The `PortletState` interface `getRenderParameters` method must return the render parameters that governed at the end of the last action, event, or render request for the portlet. If the render parameters were last set as the result of an action or event request targeting the portlet, these render parameters must be returned. If the render parameters were last set as the result of a render URL targeting the portlet, the render parameters set on the render URL must be returned.

The `RenderRequest` interface defines the `ETAG` constant and the `getETag` method for validation based caching.

15.7 `HeaderRequest` Interface

The `HeaderRequest` interface extends the `RenderRequest` interface and is used during header request processing. It is a marker interface that provides no new methods.

15.8 Lifetime of the Request Objects

Each request object is valid only within the scope of a single request phase execution. Containers commonly recycle request objects in order to avoid the performance overhead of request object creation. The developer must be aware that maintaining references to request objects outside the request phase scope may lead to non-deterministic behavior.

Chapter 16 PortletResponse Interfaces

Portlet request phases were introduced in Section 3.7 Portlet Request Processing, and explained in detail in Chapter 4 Portlet Lifecycle Interfaces.

The response objects implement corresponding portlet response interfaces to encapsulate all information to be returned from the portlet to the portlet container during request processing. This might be for example a redirection, a portlet mode change, setting the title, rendering content, etc. The portlet container will use this information to construct the response to be returned to the client. A response object is passed to the portlet `processAction`, `processEvent`, `serveResource`, `renderHeaders`, and `render` methods. It is also explicitly or implicitly available during extended annotation-based method dispatching.

The Portlet Specification introduces five portlet response interfaces for direct use by developers.

- The `HeaderResponse` allows the portlet to set properties such as HTTP headers and cookies and to generate markup to be included in the overall portal page document `HEAD` section.
- The `RenderResponse` allows the portlet to generate markup to be included in the overall portal page document `BODY` section in a manner that is compatible with other portal markup.
- The `ActionResponse` allows the portlet to set up the portlet state for a subsequent render request.
- The `EventResponse` allows the portlet to set up the portlet state for a subsequent render request.
- The `ResourceResponse` allows the portlet to write data to be passed back to the client so as to allow the resource request complete control over the response.

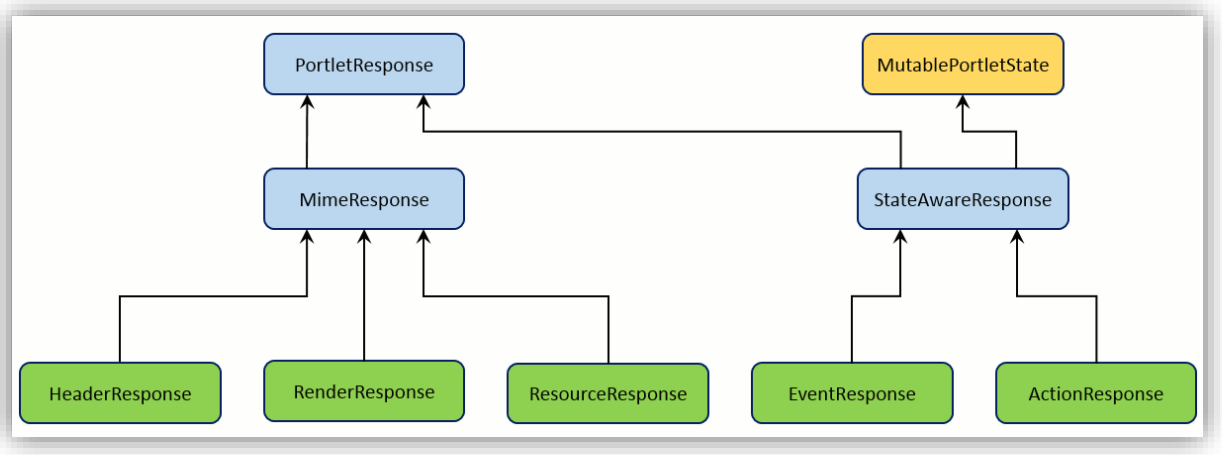


Figure 16–1 Portlet Response Interfaces

The figure above illustrates the relationship between the portlet response interfaces. The portlet response interfaces used directly by developers are shown in green. The Portlet Specification introduces the additional interfaces `PortletResponse`, `MimeResponse` and

`StateAwareResponse` in order to aggregate common functionality. The developer uses these interfaces indirectly.

The `PortletResponse` interface provides functionality needed by all portlet responses. The `MimeResponse` interface adds additional capability needed by responses that render output. The `StateAwareResponse` interface extends `MutablePortletState`, allowing the portlet state to be modified.

16.1 PortletResponse Interface

The `PortletResponse` interface defines the common functionality for all other portlet response interfaces.

16.1.1 Response Properties

Portlets can use properties to send vendor specific information to the portlet container.

A portlet can set properties using the following `PortletResponse` interface methods:

- `setProperty`
- `addProperty`

The `setProperty` method sets a property with a given name and value. A previous property value is replaced by the new value. If a set of property values exist for the name, the values are cleared and replaced with the new value. The `addProperty` method adds a property value to the set with a given name. If there are no property values already associated with the name, a new set is created.

Response properties can be viewed as header values set for the portal application. If these header values are intended to be transmitted to the client as response headers, they should be set during the header phase or before the response is committed during the resource phase.

A portlet can set HTTP headers for the response using the `setProperty` or `addProperty` methods. Headers set on the response are not guaranteed to be transported to the client as the portal application may restrict headers due to security reasons or because they conflict with headers set by other portlets on the page.

16.1.2 Setting Cookies

A portlet can set HTTP cookies on the response via the `addProperty` method that takes a `javax.servlet.http.Cookie` as parameter. The portal application is not required to transfer the cookie to the client, so the portlet should not assume that it can access the cookie on the client.

Cookies set in the response of one lifecycle call should be available to the portlet in the subsequent lifecycle calls. For example, setting a cookie during the action phase should make the cookie available during subsequent event or render phases.

For requests triggered via portlet URLs, the portlet should receive the cookie set during the last response. Cookies can be retrieved using the `PortletRequest` interface `getCookies` method.

Cookies are properties and above all restrictions about properties also apply for cookies, i.e. to be successfully transmitted back to the client, cookies must be set before the response is committed during header request processing. The portlet container must ignore cookies set during the render or resource phase after the response buffer has been flushed to the portal application (see discussion on buffering, below).

16.1.3 Setting HEAD Section markup

The PortletResponse interface addProperty method provides a method signature that allows the portlet to add an XML DOM element property to the response. This method is intended for use during the header phase.

The portlet may create a DOM element using the PortletResponse interface createElement method.

The portlet uses the addProperty(String, Element) method to indicate that the DOM element provided as an argument should be added to the overall portal response document HEAD section. Support for this property is optional. The portlet can verify if the portlet container provides this functionality by querying the MARKUP_HEAD_ELEMENT_SUPPORT property on the PortalContext. Even if this property is supported, the portal application may choose to disregard certain DOM elements to avoid conflicts with other markup or for other implementation-specific reasons.

If a DOM element with the key specified in addProperty already exists, the element will be stored in addition to the existing element under the same key. If the element is null the key must be removed from the response.

As with properties and cookies, if these header values are intended to be transmitted to the client, they must be set before the response is committed. Header values set during a render or resource request after the response is committed will be ignored by the portlet container.

16.1.4 Encoding URLs

Portlets may generate content with URLs referring to other resources within the portlet application, such as servlets, JSPs, images and other static files. Some portal/portlet container implementations may require those URLs to contain implementation-specific data. Because of this, portlets should use the encodeURL method to encode portlet URLs. The encodeURL method may include the session ID and other portlet container-specific information into the URL. If encoding is not needed, the method may return the URL unchanged.

Resources that are addressed by neither a URL encoded with encodeURL nor by a ResourceURL are not guaranteed to be accessible.

The portlet developer should be aware that the URL returned by encodeURL might not be a well formed URL but rather a special token at the time the portlet is generating its content. Thus portlets should not add additional parameters to the resulting URL or expect to be able to parse it. As a result, the outcome of the encodeURL call may be different than calling encodeURL in the servlet world.

16.1.5 Namespacing

Portlet markup may include elements, such as JavaScript function and variable names, that must be unique within the overall portal page.

The getNamespace method must return a unique string that the portlet can use to assure markup element uniqueness. The returned value must be unique for the portlet window, constant for the lifetime of the portlet window, and must be a valid JavaScript identifier[13].

[13] See the ECMAScript® Language Specification 5.1 Edition, Section 7.6 Identifier Names and Identifiers, http://www.ecma-international.org/ecma-262/5.1/#sec-7.6

As an example, the portlet can use the `getNamespace` method return value to prefix JavaScript variable names.

16.2 `StateAwareResponse` Interface

The `StateAwareResponse` interface extends the `PortletResponse` interface and the `MutablePortletState` interface to provide methods that allow the portlet to modify the portlet state and to fire events.

16.2.1 Render Parameters

The `StateAwareResponse` interface `getRenderParameters` method must return a `MutableRenderParameters` object representing the render parameters. The render parameters to be returned are determined as follows:

- During action request processing, `getRenderParameters` must return the render parameters set on the initiating action URL.
- During event request processing, `getRenderParameters` must return the render parameters that governed at the end of the last preceding action, event, or render request.

The `MutableRenderParameters` object obtained from `getRenderParameters` allows render parameters to be set, cleared, and modified. Changes made through this object must be immediately applied to the response object.

For example, a render parameter on a `StateAwareResponse` object can be set as follows:

```
Response.getRenderParameters().setValue("name", "value");
```

The portlet container must make render parameters set on the `StateAwareResponse` object available to all subsequent requests until they are changed through action or event request processing, or until a render request is initiated through a render URL containing new parameter values.

16.2.2 Portlet Modes and Window State Changes

The `setPortletMode` method allows a portlet to change its current portlet mode. If a portlet attempts to set a portlet mode that it is not allowed to switch to, a `PortletModeException` must be thrown. The portlet container may override the new portlet mode. If the portlet container accepts the new portlet mode, it must make the new portlet mode effective for subsequent requests.

The `setWindowState` method allows a portlet to change its current window state. If a portlet attempts to set a window state that it is not allowed to switch to, a `WindowStateException` must be thrown. The portlet container may override the new window state. If the portlet container accepts the new window state, it must make the new window state effective for subsequent requests.

If the portlet does not set a new portlet or window state through the `StateAwareResponse` interface, the portlet container must preserve the current portlet mode and window state.

16.2.3 Publishing Events

The portlet can publish events via the `setEvent` method. It can also call `setEvent` multiple times during a single action or event phase in order to publish multiple events (see Chapter 18 Coordination between Portlets).

16.2.4 Deprecated Methods

The following `StateAwareResponse` interface methods have been deprecated with Portlet Specification Version 3.0.

- `setParameter(String, String)`
- `setParameter(String, String…)`
- `setParameters(Map<String, String[]>)`
- `removePublicRenderParameter(String)`
- `getRenderParameterMap()`

16.3 `ActionResponse` Interface

The `ActionResponse` interface extends the `StateAwareResponse` interface and is used during action request processing. This interface provides additional methods that allow a portlet to redirect the user to another URL.

16.3.1 Redirections

The `getRedirectURL(MimeResponse.Copy)` method returns a render URL containing render parameters according to the `MimeResponse.Copy` argument. The portlet may modify the returned render URL. The returned render URL is intended to be used in the `sendRedirect(String location)` method to allow the portlet to force a redirect to the same page with modified portlet state.

If the portlet calls the `getRedirectURL(MimeResponse.Copy)` method after the portlet state has been modified, the portlet container must throw an `IllegalStateException` and the must not execute the redirection.

The ActionResponse interface provide two methods for redirecting to a different URL.

- The `sendRedirect(String location)` method instructs the portal/portlet container to set the appropriate headers and content body to redirect the user to a different URL. The portlet must specify a fully qualified URL or a full path URL. If the portlet supplies a relative path URL, the portlet container must throw an `IllegalArgumentException`.

  If the portlet calls the `sendRedirect(String location)` method after the portlet state has been modified, the portlet container must throw an `IllegalStateException` and must not execute the redirection.

- The `sendRedirect(String location, String renderUrlParamName)` method instructs the portal/portlet container to set the appropriate headers and content body to redirect the user to a different URL. The portlet must specify a fully qualified URL or a full path URL. If the portlet supplies a relative path URL, the portlet container must throw an `IllegalArgumentException`.

  The portlet container must attach a render URL with the portlet state currently set on the `ActionResponse`. The attached URL must be available as query parameter value under the key provided with the `renderUrlParamName` argument.

The portlet can modify the portlet state on the `ActionResponse` before invoking this method. The modifications must be encoded in the attached render URL, but must not affect subsequent request processing.

If the portlet calls one of the `sendRedirect` methods, the portlet container must discard any events set during action phase execution.

16.4 `EventResponse` Interface

The `EventResponse` interface extends the `StateAwareResponse` interface and provides no additional methods.

16.4.1 Deprecated Methods

The `EventResponse` interface `setRenderParameters(EventRequest request)` method has been deprecated with Portlet Specification Version 3.0. It is no longer needed since the portlet state including the render parameters will automatically be available during subsequent requests.

16.5 `MimeResponse` Interface

The `MimeResponse` interface extends the `PortletResponse` interface to add methods that allow portlets to create MIME-based content that is returned to the portal application.

16.5.1 Content Type

A portlet can set the content type of the response using the `MimeResponse` interface `setContentType` method.

When called during render request processing, the `setContentType` method must throw an `IllegalArgumentException` if the given content type does not match (including wildcard matching) any of the content types returned by the `getResponseContentTypes` method of the `PortletRequest` object. During render request processing, the portlet container should ignore any character encoding specified as part of the content type and treat the content type as if the character encoding was not specified.

The `setContentType` method must be called before the `getWriter` or `getPortletOutputStream` methods. Otherwise, the method will have no effect.

The `getContentType` method must return the content type previously set through the `setContentType` method. If no content type has been set, the `getContentType` method must return `null`.

If the portlet does not specify a content type before using the `getWriter` or `getPortletOutputStream` methods, the portlet container must use the content type that would be returned by the `PortletRequest.getResponseContentType` method and must resolve content type wildcards on a best-can-do basis.

16.5.2 Output Stream and Writer Objects

A portlet may generate its content by writing to either the `OutputStream` or to the `PrintWriter` object obtained through the `MimeResponse` interface `getPortletOutputStream` or `getWriter` methods, respectively.

Only one of the two methods, `getPortletOutputStream` or `getWriter`, can be used during a single request. If the portlet obtains an output stream, a subsequent call to `getWriter` must throw an `IllegalStateException`. Similarly, if the portlet obtains a writer, a call to the `getPortletOutputStream` must throw an `IllegalStateException`.

However, to support multiple portlet method invocations during a single request phase when using extended annotation-based dispatching, the portlet container must allow the portlet to call either `getPortletOutputStream` or `getWriter` multiple times. The portlet container should return the same object each time the method is called within the same portlet phase.

The termination of the portlet render or resource phase indicates that the portlet has satisfied the request and that the portlet container can provide the contents of the output buffer to the portal application for aggregation into the portal page.

The raw `OutputStream` is available during render request processing in order to satisfy some servlet container implementation requirements and to allow for portlets that do not generate markup fragments. Portlets should use the raw `OutputStream` only for binary content and should use the `Writer` for text-based markup. If a portlet utilizes the `OutputStream`, the portlet is responsible for using the proper character encoding.

16.5.3 Buffering

The portlet container may buffer portlet output before it is provided to the portal application for aggregation into the overall portal response.

The following `MimeResponse` interface methods allow the portlet to access and set buffering information:

- `getBufferSize`
- `setBufferSize`
- `isCommitted`
- `reset`
- `resetBuffer`
- `flushBuffer`
- `isFlushed`

These methods allow buffering operations to be performed regardless of whether the portlet is using an `OutputStream` or a `Writer`.

The portlet can use these methods during the header, render, and resource phases. The relationship of the portlet response and properties set by the portlet to the overall portal response transmitted to the client is dependent on the execution phase.

- During the header phase, the overall portal response to the client is not committed by definition, since the headers phase is executed before the portal has written the status code and headers in order to allow portlets to contribute header information. The `isCommitted` method must return `false`.

  Portlets may set properties that result in HTTP headers or cookies and may write output data for the overall document `HEAD` section.

  The buffering methods other than the `isCommitted` method apply only to the buffer that the portlet container makes available to the portlet, not to the overall portal response.

- During the render phase, the overall portal response may be committed depending on the portal implementation. A streaming portal may commit the overall response before all portlet response data is available, while a buffering portal may wait to commit the

overall response until all portlets have provided response data. The `isCommitted` method must return the committed state of the overall portal response.

Portlets may or may not be able to set properties that result in HTTP headers or cookies depending on whether or not the overall portal response has been committed, and may write output data for aggregation into the overall document `BODY` section.

The buffering methods other than the `isCommitted` method apply only to the buffer that the portlet container makes available to the portlet, not to the overall portal response.

- During the resource phase, the portlet has nearly complete control over the overall response returned to the client and may determine when the overall portal response is committed.

  The buffering methods including the `isCommitted` method apply to the overall portal response.

The `getBufferSize` method returns the size of the underlying buffer provided by the portlet container. If the portlet container uses no buffering, this method must return `0` (zero).

The portlet can request a preferred buffer size by using the `setBufferSize` method. The buffer assigned is not required to be the size requested by the portlet, but must be at least as large as the size requested. This allows the portlet container to reuse a set of fixed size buffers, providing a larger buffer than requested if appropriate. The portlet should call this method before any content is written to the `OutputStream` or `Writer`. If content has already been written, this method may throw an `IllegalStateException`.

If the portlet fills the buffer or uses the `flushBuffer` method, the portlet container must flush content from the portlet buffer to the portal application. After this occurs, the portlet can no longer affect any data that was contained in the buffer nor any properties that the portlet set.

The `isFlushed` method returns `true` if the portlet container has flushed the contents of the portlet buffer to the portal application and `false` otherwise.

The `isCommitted` method returns a `boolean` value indicating whether the portal application has written the overall portal response headers for transmission to the client.

The `reset` method clears data in the buffer that has not yet been flushed to the portal application. Properties set by the portlet prior to the reset call must be cleared as well.

The `resetBuffer` method clears content in the buffer if the portlet container has not yet flushed the portlet buffer to the portlet application without clearing the properties.

If the `reset` or `resetBuffer` method is called after the buffer has been flushed to the portal application, the portlet container must throw an `IllegalStateException`. The response and its associated buffer must be unchanged.

The portlet should use the `isFlushed` rather than the `isCommitted` method to determine whether the `reset` or `resetBuffer` methods can be called without throwing an exception.

16.5.4 Predefined MimeResponse Properties

The `MimeResponse` interface defines some constants portlets can use to set, add, and read certain properties.

16.5.4.1 Cache properties

The `MimeResponse` interface defines the property names `CACHE_SCOPE`, `EXPIRATION_CACHE`, `ETAG`, and `USE_CACHED_CONTENT` along with the property values `PRIVATE_SCOPE` and `PUBLIC_SCOPE` that can be used for validating expired content, setting new expiration times and cache scopes. See Chapter 23 Cachingfor more details.

16.5.4.2 Namespaced Response Property

The portlet may optionally use the `NAMESPACED_RESPONSE` constant to indicate to the portal application that the generated content will be completely namespaced. The portlet should set this property only when all markup id elements, form fields, etc. will be completely namespaced. One example where this might be useful is for portal applications that are form-based and thus need to re-write any forms included in the portlet markup.

The portlet must set this property using the `setProperty` method with a non-null value. The value itself is not evaluated. The value of the `NAMESPACED_RESPONSE` constant is "`X-JAVAX-PORTLET-NAMESPACED-RESPONSE`", indicating that it is intended to be a header in the portlet response to the portal application.

Portlets should set the namespaced property during the header phase.

16.5.4.3 Creating Portlet URLs

The following `MimeResponse` interface methods allow the portlet to create portlet URLs for inclusion in portlet markup. See Chapter 14 Portlet URLs for a description of portlet URLs.

- `createRenderURL()`
- `createRenderURL(Copy)`
- `createActionURL()`
- `createActionURL(Copy)`
- `createResourceURL()`

The `createRenderURL(Copy)` method returns a portlet `RenderURL` object. The render parameters will be copied to the `RenderURL` object depending on the `Copy` option.

- If the copy option is `ALL`, the current public and private render parameters will be copied to the URL.
- If the copy option is set to `NONE`, the URL object will contain neither public nor private render parameters.
- If the copy option is set to `PUBLIC`, only the public render parameters will be added to the URL. This setting corresponds to Portlet Specification 2.0 behavior.

The `createRenderURL()` method returns a portlet `RenderURL` object containing only the public render parameters. This method corresponds to using the copy option `PUBLIC` as defined above.

The `createActionURL(Copy)` method returns a portlet `ActionURL` object. The render parameters will be copied to the `ActionURL` object depending on the `Copy` option. The copy option behaves as described for the `createRenderURL(Copy)` method.

The `createActionURL()` method returns a portlet `ActionURL` object containing only the public render parameters. This method corresponds to using the copy option `PUBLIC` as defined above.

The `createResourceURL()` method returns a portlet `ResourceURL` object. The ResourceURL initially always contains both the public and the private render parameters. See Section 14.2 The Resource URL for details about the resource URL.

16.6 `RenderResponse` Interface

The `RenderResponse` interface extends the `MimeResponse` interface and is used during render request execution. This interface allows a portlet to indicate the next possible portlet modes and generate content for inclusion into the overall portal response document `BODY` section.

16.6.1 Next possible portlet modes

A portlet may indicate to the portal application the next possible portlet modes that make sense from the portlet point of view by providing a collection of candidate portlet modes through the `setNextPossiblePortletModes` method.

If the portlet provides a collection of next possible portlet modes, the portal should honor them by providing the end user with portlet mode choices limited to the provided collection of portlet modes or a subset of those modes based on access control considerations.

If the portlet does not set any next possible portlet modes, the portlet container should consider all portlet modes defined as supported portlet modes in the portlet configuration as possible new portlet modes.

16.6.2 Deprecated Methods

The `RenderResponse` interface `setTitle` method has been deprecated with Portlet Specification Version 3.0. This methods has been moved to the `HeaderResponse` interface.

16.7 `HeaderResponse` Interface

The `HeaderResponse` interface extends the `RenderResponse` interface and is used during the header phase. This interface adds the `addProperty` and `setProperty` methods and also new behavior.

This interface is used during the header phase, which the portlet container must execute before the overall portal response has been committed in order to allow the portlet to contribute header information. The portlet can use the `addProperty` and `setProperty` methods described above to do so.

The portlet can use the `HeaderResponse` interface `setTitle` method to set the preferred title. The portlet container is not required to use the preferred title set by the portlet.

In addition, the portlet can use the `OutputStream` and `PrintWriter` objects obtained through the `HeaderResponse` interface to write content for inclusion into the overall portal response document `HEAD` section.

16.8 `ResourceResponse` Interface

The `ResourceResponse` interface extends the `MimeResponse` interface to provide additional methods useful during resource serving. This interface allows a portlet to generate content that is directly served to the client, including binary content.

The portlet container may pre-set character encoding and locale, however, the portlet can override the preset values by setting the character encoding and the locale of the response using the `setCharacterEncoding` and `setLocale` methods, respectively.

The `setStatus` method sets the HTTP status code for this request. The status code should be a valid value as defined in IETF rfc2616 "Hypertext Transfer Protocol -- HTTP/1.1" . The portlet may use the status code constants "SC_*" defined in the `HttpServletResponse` interface to designate status code values. This method has no effect if it is called after the response has been committed.

16.8.1 Setting the Response Character Set

The portlet can set the character encoding for a resource response in several ways:

- Using the `setCharacterEncoding` method.
- Using the `setContentType` method. Calls to `setContentType` set the character encoding only if the given content type string provides a value for the `charset` attribute.
- Using the `setLocale` method and a `locale-encoding-mapping-list` mapping in the `web.xml` deployment descriptor[14]. Calls to `setLocale` set the character encoding only if neither the `setCharacterEncoding` nor the `setContentType` method has previously set the character encoding.

If the portlet does not set a character encoding using one of the possibilities listed above before calling `getWriter`, the portlet container must use UTF-8 as the default character encoding.

16.9 Lifetime of Response Objects

Each response object is valid only within the scope of a single request processing phase. Containers commonly recycle response objects in order to avoid the performance overhead of response object creation. The developer must be aware that maintaining references to response objects outside the request phase scope may lead to non-deterministic behavior.

[14] See Servlet Specification Version 3.1 Section 5.5 Internationalization for details.

Chapter 17 Portlet Filters

Filters are Java components that allow on the fly transformations of information in both the request to and the response from a portlet.

17.1 What is a portlet filter?

A filter is a reusable piece of code that can transform the content of portlet requests and portlet responses. Filters do not generally create a response or respond to a request as portlets do, rather they modify or adapt the requests, and modify or adapt the response.

Among the types of functionality available to the developer needing to use filters are the following:

- The modification of request data by wrapping the request in customized versions of the request object.
- The modification of response data by providing customized versions of the response object.
- The interception of an invocation of a portlet after its call.

Portlet filters are modeled after the servlet filters in order to make them easy to understand for people already familiar with the servlet model and to have one consistent filter concept in Java EE.

17.2 Main Concepts

The main concepts of this filtering model are described in this section. The application developer creates a filter by implementing one of the `javax.portlet.filter.XYZFilter` interfaces and providing a public constructor taking no arguments. The class is packaged in the portlet application WAR along with the static content and portlets that make up the portlet application.

A filter can be declared using the `<filter>` element in the portlet deployment descriptor. A filter or collection of filters can be configured for invocation by defining `<filter-mapping>` elements in the portlet deployment descriptor. This is done by mapping filters to a particular portlet by the portlet's logical name, or mapping to a group of portlets using the '*' as a wildcard.

A filter can also be declared using the `@PortletRequestFilter` annotation.

17.2.1 Filter Lifecycle

After deployment of the portlet application, and before a request causes the portlet container to access a portlet, the portlet container must build an ordered list of the portlet filters to be applied to the portlet as defined in the portlet configuration. The portlet container must instantiate a filter of the appropriate class for each applicable filter and called the filter `init(FilterConfig config)` method. The filter may throw an exception to indicate that it cannot function properly. If the exception is of type `UnavailableException`, the portlet container may examine the `isPermanent` attribute of the exception and may choose to retry the filter at some later time.

The portlet container must instantiate only one instance of each configured filter per Java Virtual Machine. The portlet container provides the filter configuration through a `FilterConfig` object. The `FilterConfig` object contains a reference to the `PortletContext` for the portlet application, and the set of initialization parameters provided through the filter configuration.

When the portlet container receives an incoming request, it takes the first filter instance in the list and calls its `doFilter` method, passing in the `PortletRequest`, the `PortletResponse`, and a reference to the `FilterChain` object it will use.

Depending on the target method of the `doFilter` call, the `PortletRequest` and `PortletResponse` must be instances of the following interfaces:

- `ActionRequest` and `ActionResponse` for action request processing
- `EventRequest` and `EventResponse` for event request processing
- `HeaderRequest` and `HeaderResponse` for header request processing
- `RenderRequest` and `RenderResponse` for render request processing
- `ResourceRequest` and `ResourceResponse` for resource request processing

The `doFilter` method of a filter will typically be implemented following this or some subset of the following pattern:

1. The method examines the request information.
2. The method may wrap the request object passed in to its `doFilter` method with a customized implementation of one of the request wrappers (`ActionRequestWrapper`, `EventRequestWrapper`, `HeaderRequestWrapper`, `RenderRequestWrapper`, `ResourceRequestWrapper`) in order to modify request data.
3. The method may wrap the response object passed in to its `doFilter` method with a customized implementation of one of the response wrappers (`ActionResponseWrapper`, `EventResponseWrapper`, `HeaderResponseWrapper`, `RenderResponseWrapper`, `ResourceResponseWrapper`) to modify response data.
4. The filter may invoke the next component in the filter chain. The next component may be another filter, or if the filter making the invocation is the last filter configured for this chain, the next component is the target method of the portlet. The invocation of the next component is effected by calling the `doFilter` method on the `FilterChain` object, and passing in the request and response with which it was called or passing in wrapped versions it may have created.

   The `FilterChain` interface `doFilter` method, provided by the portlet container, must locate the next component in the filter chain and invoke its `doFilter` method, passing in the appropriate request and response objects. Alternatively, the filter chain can block the request by not making the call to invoke the next component, leaving the filter responsible for filling out the response object.
5. After invocation of the next filter in the chain, the filter may examine the response data.
6. If the filter throws a `UnavailableException` during its `doFilter` processing, the portlet container must not attempt continued processing down the filter chain. It may choose to retry the whole chain at a later time if the exception is not marked permanent.
7. When the last filter in the chain has been invoked, the next component accessed is the target method on the portlet at the end of the chain.

8. Before a filter instance can be removed from service by the portlet container, the portlet container must first call the `destroy` method on the filter to enable the filter to release any resources and perform other cleanup operations.

17.2.2 Wrapping Requests and Responses

Central to the notion of filtering is the concept of wrapping a request or response in order that it can override behavior to perform a filtering task. In this model, the developer has the ability to override existing methods on the request and response objects. The portlet should not add additional methods to the wrapper as further downstream wrappers may not honor these. In order to support this style of filter the container must support the following requirement. When a filter invokes the `FilterChain` interface `doFilter` method, the portlet container must ensure that the request and response object that it passes to the next component in the filter chain, or to the target portlet if the filter was the last in the chain, is the same object that was passed into the calling filter `doFilter` method or one of the above mentioned wrappers.

17.2.3 Filter Environment

A set of initialization parameters can be associated with a filter using the `<init-params>` element in the portlet deployment descriptor or using the `@PortletRequestFilter` annotation `initParams` element. The names and values of these parameters are available to the filter at runtime via the `getInitParameter` and `getInitParameterNames` methods on the filter's `FilterConfig` object. Additionally, the `FilterConfig` affords access to the `PortletContext` of the portlet application for the loading of resources, for logging functionality, and for storage of state in the `PortletContext` attribute list.

17.2.4 Filter Configuration

17.2.4.1 Configuration through the Deployment Descriptor

A filter is defined in the deployment descriptor using the `<filter>` element. In this element, the programmer declares the following:

- `filter-name`: used to map the filter to a portlet
- `filter-class`: used by the portlet container to identify the filter type
- `lifecycle`: used to determine for which lifecycles the filter should be applied
- `init-params`: initialization parameters for a filter

Optionally, the programmer can specify a textual description and a display name for tool manipulation. The portlet container must instantiate exactly one instance of the Java class defining the filter per filter declaration in the deployment descriptor. Hence, two instances of the same filter class will be instantiated by the portlet container if the developer makes two filter declarations for the same filter class.

Here is an example of a filter declaration:

```
<filter>
    <filter-name>Log Filter</filter-name>
    <filter-class>com.acme.LogFilter</filter-class>
    <lifecycle>ACTION_PHASE</lifecycle>
</filter>
```

Once a filter has been declared in the portlet deployment descriptor, the `<filter-mapping>` element is used to define portlets in the portlet application to which the filter is to be applied. Filters can be associated with a portlet using the `<portlet-name>` element. Each filter mapping

matching the portlet should be applied for this portlet, even if that result in one filter being applied more than once.

For example, the following code example maps the `Log Filter` to the `SamplePortlet` portlet:

```
<filter-mapping>
    <filter-name>Log Filter</filter-name>
    <portlet-name>SamplePortlet</portlet-name>
</filter-mapping>
```

Filters can be associated with groups of portlets using the '*' character as a wildcard at the end of a string to indicate that the filter must be applied to any portlet whose name starts with the characters before the "*" character. Example:

```
<filter-mapping>
    <filter-name>Log Filter</filter-name>
    <portlet-name>*</portlet-name>
</filter-mapping>
```

Here the `Log Filter` is applied to all the portlets within the portlet application, because every portlet name matches the '*' pattern.

The portlet container must build the chain of filters to be applied to a particular request using the same order that the filter mapping elements applicable to the portlet appear in the deployment descriptor. The portlet container is free to add additional filters at any place in this filter chain, but must not remove filters matching a specific portlet. .

It is expected that high performance portlet containers will cache filter chains so that they do not need to compute them on a per-request basis.

A portlet filter can be applied to the portlet action, event, render, and resource request processing methods. Thus the filter must define the lifecycle method for which the filter is written in the `<lifecycle>` element of the `<filter>` element. A filter can be applied to one or more lifecycle methods. The following constants are valid values for the `<lifecycle>` element:

- `ACTION_PHASE` requesting that the portlet container processes this filter for action request processing. The filter implementation must implement the `ActionFilter` interface.
- `EVENT_PHASE` requesting that the portlet container processes this filter for event request processing. The filter implementation must implement the `EventFilter` interface.
- `HEADER_PHASE` requesting that the portlet container processes this filter for render request processing. The filter implementation must implement the `HeaderFilter` interface.
- `RENDER_PHASE` requesting that the portlet container processes this filter for render request processing. The filter implementation must implement the `RenderFilter` interface.
- `RESOURCE_PHASE` requesting that the portlet container processes this filter for resource request processing. The filter implementation must implement the `ResourceFilter` interface.

If the lifecycle declaration and portlet filter type do not match the portlet container is free to either reject the portlet at deployment time or ignore the filter.

Example:

```
<filter>
    <filter-name>Sample Filter</filter-name>
    <filter-class>com.acme.SampleFilter</filter-class>
    <lifecycle>ACTION_PHASE</lifecycle>
    <lifecycle>RENDER_PHASE</lifecycle>
</filter>
```

In this example the portlet filter is applied to the action and render phase.

17.2.4.2 Filter Configuration through Annotation

The `@PortletRequestFilter` annotation is a type annotation that designates a portlet filter class. The filter class may be any valid CDI managed bean provided by the portlet that implements one or more of the following interfaces. Each of the interfaces is associated with a specific request processing type, and thus lifecycle phase, corresponding to the discussion in the preceding section. The portlet container must determine the lifecycle phases to which the filter is to be applied through the interfaces implemented by the filter.

Filter	Request Processing Type
`javax.portlet.filter.ActionFilter`	action request processing
`javax.portlet.filter.EventFilter`	event request processing
`javax.portlet.filter.HeaderFilter`	header request processing
`javax.portlet.filter.RenderFilter`	render request processing
`javax.portlet.filter.ResourceFilter`	resource request processing

If the `@PortletRequestFilter` annotation is applied to a class that does not implement one of these interfaces, the portlet container must not place the portlet in service. The appropriate error handling and message display is left as a portal implementation detail.

If more than one filter class is annotated for a given filter interface type, the order of execution is determined by the `ordinal` element within the `@PortletRequestFilter` annotation. Annotated methods with a lower ordinal number are executed before methods with a higher ordinal number. If two annotated methods have the same ordinal number, both methods will be executed, but the execution order will be undetermined.

Portlets should generally configure filters either exclusively through the deployment descriptor or exclusively through annotations. If portlet filters are configured through both means, the annotated filter class methods will be executed before the filters configured through the deployment descriptor.

The annotated filter class can apply to multiple portlets within the portlet application. The names of the portlets for which the listener applies must be specified in the `@PortletRequestFilter` `portletNames` element. A wildcard character '*' can be specified in the first `portletName` array element to indicate that the listener is to apply to all portlets in the portlet application. If specified, the wildcard character must appear alone in the first array element.

The `@PortletRequestFilter` annotation contains the following elements.

Element	Description
`portletNames`	The portlet names for which the listener applies.

Element	Description
`ordinal`	The ordinal number for this annotated method.
`description`	The locale-specific filter description for tool use
`displayName`	The locale-specific display name for tool use
`locale`	The locale applicable to the `description` and `displayName` elements

The following example shows a filter configured for the portlets TestPortlet1 and TestPortlet2.

```
@PortletRequestFilter(portletNames = {"TestPortlet1", "TestPortlet2"},
                      ordinal=200)
public class FilterTest2 implements RenderFilter, ActionFilter {

   @Override
   public void init(FilterConfig config) throws PortletException {
   }

   @Override
   public void destroy() {
   }

   @Override
   public void doFilter(ActionRequest request, ActionResponse response,
         FilterChain chain) throws IOException, PortletException {
      // do something
   }

   @Override
   public void doFilter(RenderRequest request, RenderResponse response,
         FilterChain chain) throws IOException, PortletException {
      // do something
   }
}
```

Chapter 18 Coordination between Portlets

The Portlet Specification defines the following mechanisms for coordination between portlets:

- Portlets and other artifacts in the same web application can share data through the session in the application scope (see Section 20.2 Session Scope)
- Portlets can share render state through the public render parameters (see 12.2.1 Public Render Parameters).

  Using public render parameters instead of events avoids the additional event request processing overhead and allows the end-user to use the browser navigation and bookmarking if the portal stores the render parameters in the URL.

  As an example, a weather portlet might display the weather of a selected city. It therefore uses the public render parameters for encoding the zip code. Another portlet on the page could allow the location to be selected and set the public render parameter appropriately.
- Portlets can send and receive portlet events.

  Portlet events are intended to allow portlets to react to actions or state changes not directly related to an interaction of the user with the portlet. Events could be either portal or portlet container generated or the result of a user interaction with other portlets. The portlet event model is a loosely coupled, brokered model that allows creating portlets as separate entities that can be wired together at runtime. The means of wiring different portlets together is portal implementation specific.

  Portlet events are not a replacement for reliable messaging (use other Java EE technologies such as the Java Message Service for this purpose). Portlet events are not guaranteed to be delivered and thus the portlet should always work in a meaningful manner even if some or all events are not delivered.

  In response to an event, a portlet may update the portlet state and may publish new events for delivery to other portlets and thus trigger state changes on these other portlets.

  As an example, a shopping cart portlet may fire an event when items are purchased. An inventory portlet might update its state when such an event is received.

Note that it is outside the scope of this specification to define how portlets are wired together for sharing public render parameters or routing events. Nor does the Portlet Specification define how portlets relate to each other or to a portal page. This is done on portal application level and is not reflected in the Java Portlet API or portlet configuration.

18.1.1 EventPortlet Interface

In order to receive events the portlet must implement the `EventPortlet` interface in the `javax.portlet` package or implement a `@EventMethod` annotated method. The portlet container will invoke event processing for each event targeted to the portlet, and provide the portlet with an `EventRequest` and `EventResponse` object. Events are targeted to a specific portlet window in the current client request.

Event processing is a lifecycle operation that occurs during the action phase.

18.1.2 Event Declaration

The portlet should declare all event definitions as well as the events that it publishes and processes in the portlet configuration. The declaration can take place through the portlet deployment descriptor or through use of annotations. See Sections 28.1.8 Event Configuration on page 176 and 28.2.10 Event on page 188 for more information on declaring events in the portlet application configuration and portlet configuration, respectively.

The event definition provide the portlet container with the event qualified name and the event payload type for each event. Event names are represented as `QNames` in order to make them uniquely identifiable.

The events that the portlet publishes and those that it can process are declared separately from the event definition. The set of publishing events can differ from the set of processing events.

Portlet containers will typically route only declared processing events to the portlet.

18.1.2.1 Event Payload

The default XML to Java mapping that every container should support is the JAXB mapping. Portlet containers are free to support additional mapping mechanisms beyond the JAXB mapping. For optimization purposes in local Java runtime environments the portlet container can use Java serialization or direct Java object passing for the event payload. The portlet must not make any assumptions on the mechanism the portlet container chooses to pass the event payload.

The Portlet Specification uses the JAXB XML Binding 2.0 for defining event payload data that may be transported across a network via remote protocols such as Web Services for Remote Portlets (WSRP) 2.0.

The event payload must be defined using the JAXB annotations in the Java class definition and by defining the Java class name of the event payload object in the portlet configuration using the deployment descriptor `value-type` element or using the `@PortletConfiguration` annotation.

The event payload must have a valid JAXB binding, or be in the list of Java primitive types and standard classes defined in the JAXB 2.0 specification section 8.5.1 or section 8.5.2, and must implement `java.io.Serializable`. Otherwise the portlet container must throw a `java.lang.IllegalArgumentException`. The primitive type `xsd:anyURI` must be mapped to `java.net.URI` rather than the JAXB default `java.lang.String` in order to avoid losing semantics

18.1.2.2 Events not declared in the Configuration

The portlet can publish events that are not declared in the portlet configuration. Note that if the events are not declared in the portlet configuration, the portlet container might not be able to route them. How the portlet container handles such events is left as an implementation detail.

18.1.3 Processing Events

The portlet may optionally receive events from other portlets, such as an item being added to a shopping cart, or may receive container events, such as a portlet mode change event.

The portlet can access the triggering event object using the `EventRequest` interface `getEvent` method. This method returns an object of type `Event` encapsulating the current event name and value. The event must always have a name and may optionally have a value.

The event name can be either retrieved with the `getQName` method that returns the complete `QName` of the event, or with the `getName` method that only returns the local part of the event name.

If the event has a value it must be an object of the type defined in the portlet configuration.

18.1.4 Sending Events

The portlet may publish events using the `StateAwareResponse` interface `setEvent` method during action or event request processing. The `StateAwareResponse` methods are exposed via the `ActionResponse` and `EventResponse` interfaces. The portlet can call the `setEvent` multiple times during action or event request execution in order to fire multiple events. The events fired will be processed by the portlet container after request processing has finished.

Events can be published using either the full qualified event name with the `setEvent(QName, Serializable)` method, or using the event qualified name local part with the `setEvent(String, Serializable)` method. If only the local part is specified, the portlet container must use the default namespace defined in the portlet configuration. If no default namespace is provided, the portlet container must use the XML default namespace `javax.xml.XMLConstants.NULL_NS_URI`.

The event payload must be an object of the type defined in the portlet configuration.

18.1.5 Event Processing

Events are valid only within current client request processing. The portlet container must therefore deliver all events within the current client request. Event delivery is not guaranteed and the container may restrict event delivery in a meaningful manner, e.g. in order to prevent endless loops.

Events are not ordered and the container may re-order the received events before distributing them. Portal applications should distribute events returned by a single portlet in the order the portlet called the `setEvent` method but this ordering is not guaranteed. Thus portlet developers should rely on other mechanisms such as adding ordering information to the event payload if required.

Event distribution is non-blocking and can happen in parallel for different portlet windows.

Event distribution must be serialized for a specific portlet window per client request so that at any given time a portlet window is processing only one event for the current client request. Conceptually, the portlet container should queue the events for each portlet window per client request. When processing the queue the container should take any previously returned event response data, like render parameters, portlet mode, window state, into account and supply these updated values with the next event request.

Note that event processing for different portlets within the current client request may happen in parallel and that therefore if portlets update shared data like public render parameters or information in the application session during event processing, the last state change wins.

Container raised events are issued by the portlet container and not a portlet. The portlet should not publish container events, only process them. Container events published by the portlet

should be ignored by the portlet container. If a portlet would like to receive a container raised event it should declare the event in the portlet configuration.

18.1.6 Exceptions during event processing

A portlet may throw a `PortletException`, a `PortletSecurityException` or a `UnavailableException` during event processing.

A `PortletException` signals that an error has occurred during the processing of the event and that the portlet container should take appropriate measures to clean up the event processing. If a portlet throws an exception during event processing, all operations on the `EventResponse` must be ignored. The portlet container should continue processing other events targeted to the portlet and the other portlets participating in the current client request. Error handling is otherwise left to the portal implementation.

A `UnavailableException` signals that the portlet is unable to handle requests either temporarily or permanently.

If the exception indicates permanent unavailability, the portlet container must remove the portlet from service immediately, call the portlet's `destroy` method, and release the portlet object. A portlet that throws a permanent `UnavailableException` must be considered unavailable until the portlet application containing the portlet is restarted.

If the exception indicates temporary unavailability, then the portlet container may choose not to route any requests to the portlet during the time period of the temporary unavailability.

The portlet container may choose to ignore the distinction between a permanent and temporary unavailability and treat all occurrences of `UnavailableException` as permanent and remove the portlet from service.

A `RuntimeException` thrown during the event handling must be handled as a `PortletException`.

18.2 Predefined Container Events

The Web Service for Remote Portlets (WSRP) specification predefines some common events that should be leveraged when requiring an event for one of the following scenarios:

- Event handling failed (`wsrp:eventHandlingFailed`) –This is a portal application generated event which signals to the portlet that the portal application detected that errors occurred while distributing events. As a simple notification, this event carries no predefined payload, but does use an open content definition.
- Navigations context changed (`wsrp:newNavigationalContextScope`)– allowing the portlet to manage its own navigational context in a consistent manner with the navigational context managed by the portal application.
- New portlet mode (`wsrp:newMode`) – indicating to the portlet that it has been put into a new portlet mode and allowing the portlet to pre-set some state before getting rendered in this new mode.
- New window state(`wsrp:newWindowState`) – indicating to the portlet that it has been put into a new window state and allowing the portlet to pre-set some state before getting rendered in this window state.

See section 5.11 of the Web Services for Remote Portlets specification V2.0 for more details.

Portlet containers may optionally provide support for these events. Portlet containers that support the predefined events should deliver these events to all portlets that declare processing event support for them in the portlet configuration.

Chapter 19 Portlet Preferences

Portlets are commonly configured to provide a customized view or behavior for different users. This user-specific configuration is represented as a persistent set of name-value pairs and it is referred to as portlet preferences. The preference attribute name or key is a `String` and the preference attribute value is a `String` array. The portlet container is responsible for retrieving and storing the portlet preferences.

Portlet preferences are intended to store basic configuration data for portlets. It is not the purpose of the portlet preferences to replace general purpose databases.

19.1 `PortletPreferences` Interface

Portlets access the portlet preference attributes through the `PortletPreferences` interface. Portlets can access to the associated `PortletPreferences` object while they are processing requests. Portlets may only modify preferences attributes during action phase or resource phase execution.

To access and manipulate preference attributes, the `PortletPreferences` interface provides the following methods:

- `getNames`
- `getValue`
- `setValue`
- `getValues`
- `setValues`
- `getMap`
- `isReadOnly`
- `reset`
- `store`

The `getMap` method returns an immutable `Map` of `String` keys and `String[]` values containing all current preference values for the given key. Preference attribute values must not be modified if the values in the `Map` are altered. The `getValue` and `setValue methods` are convenience methods for dealing with single values. If a preference attribute has multiple values, the `getValue` method returns the first value. The `setValue` method sets a single value into a preferences attribute, replacing any existing values.

The following code sample demonstrates how a stock quote portlet would retrieve from its preferences object, the preferred stock symbols, the URL of the backend quoting services and the quote refresh frequency.

```
PortletPreferences prefs = req.getPreferences();
String[] symbols =
    prefs.getValues("preferredStockSymbols",
                    new String[]{"ACME","FOO"});
String url = prefs.getValue("quotesFeedURL", null);
int refreshInterval =
    Integer.parseInt(prefs.getValue("refresh","10"));
```

The `reset` method must reset a preference attribute to its default value. If there is no default value, the preference attribute must be deleted. It is left to the vendor to specify how and from where the default value is obtained.

If a preference attribute is read only, the `setValue`, `setValues` and `reset` methods must throw a `ReadOnlyException` when the portlet is in any of the standard modes.

The `store` method must persist all the changes made to the `PortletPreferences` object into the persistent store. If the call returns successfully, it is safe to assume the changes are permanent. The `store` method must be conducted as an atomic transaction regardless of how many preference attributes have been modified. The portlet container implementation is responsible for handling concurrent writes to avoid inconsistency in portlet preference attributes. All changes made to `PortletPreferences` object not followed by a call to the `store` method must be discarded when the portlet completes action request, event request, or resource request processing. If the `store` method is invoked within the render phase, it must throw an `IllegalStateException`.

The `PortletPreferences` object must reflect the current values of the persistent store when the portlet container invokes any portlet request method.

19.2 Preference Attributes Scopes

Portlet Specification assumes preference attributes are user specific, but it does not make any provision at the API level or at the semantic level for sharing preference attributes among users.

However, it enables sharing of preferences and enables definition of different levels of portlet entities (see Section 4.3.1 Portlet Definition and Portlet Entity). Portlet preference sharing and portlet entity level definition is not covered by the Portlet Specification and is implementation specific.

If a portal/portlet-container implementation provides an extension mechanism for sharing preference attributes, it should be well documented. Sharing preference attributes may have significant impact on the behavior of a portlet. In many circumstances, it could be inappropriate to share attributes that are meant to be private or confidential for a specific user.

19.3Preference Attributes definition

The portlet configuration define preference attributes. A preference attribute definition may include initial default values. A preference attribute definition may also indicate if the attribute is read only.

If a preference attribute is not defined to be read-only, the preference attribute must be modifiable when the portlet is processing an action or event request in any of the standard portlet modes (`VIEW`, `EDIT` or `HELP`).

Portlets may change the value of modifiable preference attributes using the `setValue`, `setValues` and `reset` methods of the `PortletPreferences` interface. Administrators who deploy portlets may set the deployment descriptor preference `read-only` element to `true` to

fix certain preference values at deployment time. Portals may allow changing read-only preference attributes while performing administration tasks.

Portlets are not restricted to use only the preference attributes defined in the portlet configuration. They can also programmatically add preference attributes using names not defined in the portlet configuration. These preferences attributes must be treated as modifiable attributes.

Portal administration and configuration tools may use and change default preference attributes when creating a new portlet preferences objects. In addition, the portal may further constrain the modifiability of preferences values.

19.3.1 Localizing Preference Attributes

The Portlet Specification does not define a specific mechanism for localizing preference attributes. It leverages the J2SE `ResourceBundle` classes.

To enable localization support of preference attributes for administration and configuration tools, developers should adhere to the following naming convention for entries in the portlet's `ResourceBundle` (see Section 28.2.5 Portlet Resource Bundle).

Entries for preference attribute descriptions should be constructed as `'javax.portlet.preference.description.<attribute-name>'`, where `<attribute-name>` is the preference attribute name.

Entries for preference attribute names should be constructed as `'javax.portlet.preference.name.<attribute-name>'`, where `<attribute-name>` is the preference attribute name. These values should be used as localized preference display names.

Entries for preference attribute values that require localization should be constructed as `'javax.portlet.preference.value.<attribute-name>.<attribute-value>'`, where `<attribute-name>` is the preference attribute name and `<attribute-value>` is the localized preference attribute value.

19.4 Validating Preference Values

The portlet can register a preferences validator in the portlet configuration that is invoked when the `PortletPreferences` interface `store` method is invoked. The registration can be performed through the portlet deployment descriptor or through annotations.

The preferences validator contains a method that accepts the current `PortletPreferences` object. The `store` method must invoke the preferences validator method before writing the changes to the persistent store. If the validation fails, the preferences validator must throw a `ValidatorException`. If a `ValidatorException` is thrown, the portlet container must cancel the store operation and it must propagate the exception to the portlet. If the validation is successful, the store operation must be completed. The portlet should not modify the portlet preferences during validation.

When creating a `ValidatorException`, portlet developers may include the set of preference attributes that caused the validator to fail. It is left to the developers to indicate the first preference attribute that failed or the name of all the invalid preference attributes.

The preferences validator must be coded in a thread safe manner as the portlet container may invoke it concurrently due to parallel request processing.

19.4.1 Configuration through the Deployment Descriptor

To register a preferences validator in the deployment descriptor, the developer must provide a class implementing the `PreferencesValidator` interface. The `PreferencesValidator` interface contains a single `validate` method that accepts a `PortletPreferences` object.

The preferences validator class can be associated with the preferences definition in the deployment descriptor, as shown in the following example.

```
<!—- Portlet Preferences -->
<portlet-preferences>
    ...
    <preferences-validator>
    com.foo.portlets.XYZValidator
    </preferences-validator>
</portlet-preferences>
```

19.4.2 Configuration through Annotation

The `@PreferencesValidator` annotation designates a preferences validator method. The method may be located in any valid CDI managed bean class provided by the portlet.

The annotated method must have the following signature:

```
public void <methodName>(PortletPreferences preferences)
                            throws ValidatorException
```

The method name can be freely selected.

If the `@PreferencesValidator` annotation is applied to a method that does not meet the method signature requirement, the portlet container must not place the portlet in service. The appropriate error handling and message display is left as a portal implementation detail.

If more than one method is annotated, the order of execution is determined by the `ordinal` element within the `@PortletPreferences` annotation. Annotated methods with a lower ordinal number are executed before methods with a higher ordinal number. If two annotated methods have the same ordinal number, both methods will be executed, but the execution order will be undetermined.

Portlets should generally configure preference validators either exclusively through the deployment descriptor or exclusively through annotations. If they are configured through both means, the annotated methods will be executed before the preference validators configured through the deployment descriptor.

The annotated method can apply to multiple portlets within the portlet application. The names of the portlets for which the listener applies must be specified in the `@PreferencesValidator` `portletNames` element. A wildcard character '*' can be specified in the first `portletName` array element to indicate that the listener is to apply to all portlets in the portlet application. If specified, the wildcard character must appear alone in the first array element.

The `@PreferencesValidator` annotation contains the following elements.

Element	Description
`portletNames`	The portlet names for which the preference validator applies.
`ordinal`	The ordinal number for this annotated method.

Chapter 20 Sessions

To build effective portlet applications, it is imperative that requests from a particular client be associated with each other. The idea of a session was introduced in order to provide continuity between requests from the same client. Session tracking allows requests from a specific client to be associated with a session.

There are many session tracking approaches such as use of HTTP Cookies, SSL Sessions or URL rewriting. To free the programmer from having to deal with session tracking directly, this specification defines a `PortletSession` interface that allows the portlet container to use any of the approaches to track a user's session without involving the developers in the nuances of any one approach. The actual session tracking approach used is a portlet container implementation detail and will not be covered further in this specification.

20.1 Creating a Session

A session is considered "new" when it is only a prospective session and has not been established. Because the Portlet Specification is designed around a stateless request-response protocol (HTTP), a session is considered to be new until a client "joins" it. A client joins a session when session tracking information has been returned to the server indicating that a session has been established. Until the client joins a session, it cannot be assumed that the next request from the client will be recognized as part of a session.

The session is considered to be "new" if either of the following is true:

- The client does not yet know about the session
- The client chooses not to join a session

These conditions define the situation where the portlet container has no mechanism by which to associate a request with a previous request. The `PortletSession` interface `isNew` method allows the portlet to query whether a portlet session is new.

The portlet can obtain or create a portlet session through use of the `PortletRequest` interface `getPortletSession` method. The `PortletSession` object so obtained is only valid within the current client request.

The portlet container must ensure that portlets within the same portlet application participate in the same portlet session. The `PortletRequest` interface `getPortletSession` method must return the same portlet session object to all portlets within the same portlet application.

20.2 Session Scope

`PortletSession` objects must be scoped at the portlet application context level. The portlet container must not share the `PortletSession` object or the attributes stored in it among different portlet applications or among different user sessions.

Each portlet application has its own distinct `PortletSession` object per user session.

20.3 Relationship to HttpSession

A portlet application is a web application. The portlet application may contain web components such as servlets and JSPs in addition to portlets. The portlet session is based on the servlet session to allow information sharing between portlets and other web components. The portlet container must store information placed into the portlet session in a manner that makes the information available through the servlet session. The information must be available to any portlet, servlet or JSP within the same portlet application.

The portlet container must ensure that all attribute objects placed in the `PortletSession` object are also available through the portlet application `HttpSession` object, and visa-versa. However, the attribute names used to access the objects through the `HttpSession` are subject to namespacing considerations described in the following section.

If the `HttpSession` object is invalidated, the portlet container must also invalidate the corresponding `PortletSession` object. If a portlet invalidates the `PortletSession` object, the portlet container must invalidate the corresponding `HttpSession` object.

Portlet applications can use servlet session lifecycle listeners to monitor the portlet session (see 2.2 Using Servlet Application Lifecycle Events).

20.4 Binding Attributes to a Portlet Session

A portlet can bind an object attribute to a `PortletSession` by name.

The `PortletSession` interface defines two portlet session scopes for storing objects, `APPLICATION_SCOPE` and `PORTLET_SCOPE`. The `APPLICATION_SCOPE` scopes the object to the portlet application, while the `PORTLET_SCOPE` scopes the object to the portlet. The portlet session scope affects the name by which the portlet container stores the attribute in the underlying servlet session.

Any object stored in the portlet session with `APPLICATION_SCOPE` is stored under the same attribute name in the `HttpSession`, and is available under that name to any other portlet or web component that belongs to the same portlet application.

Objects stored in the portlet session with `PORTLET_SCOPE` must be available to the portlet during requests targeted to the portlet window that was active when the objects were stored. Since the same portlet might appear in multiple portlet windows within a single session, the portlet container must namespace such attributes when storing them in the `HttpSession` so that they can be identified as being associated with a specific portlet window.

The portlet container must encode the attribute names of PORTLET_SCOPE scoped portlet session attributes in the `HttpSession` according to the following scheme:

```
javax.portlet.p.<ID>?<ATTRIBUTE_NAME>
```

The `<ID>` field is a unique identifier for the portlet window assigned by the portlet container. This must the same ID string returned by the `PortletRequest.getWindowID()` method. The `<ID>` must not contain a '?' character.

The `<ATTRIBUTE_NAME>` field is the attribute name provided by the portlet when setting the `PORTLET_SCOPE` scoped object on the portlet session.

The portlet need not be concerned with the `PORTLET_SCOPE` naming scheme when accessing the attributes through the `PortletSession` object. The portlet uses the plain attribute name with no prefix to access the attribute. The portlet container must handle the required attribute name encoding and decoding transparently for the portlet.

However, PORTLET_SCOPE portlet session scoped attributes are available through the HttpSession only through the encoded names as described above.

The PortletSessionUtil class provides utility methods to handle portlet session attributes read from the HttpSession object. They are intended to be used to decode portlet session attribute names within HTTP session listeners and other web components that provide access to the HttpSession. The decodeAttributeName method returns the attribute name used by the portlet when setting the attribute. Any prefix added to the attribute name by the portlet container for portlet session attributes stored with PORTLET_SCOPE is removed. The decodeScope method returns the portlet session scope with which the given attribute name was stored. Portlet developers should always use the PortletSessionUtil class to deal with attributes stored with PORTLET_SCOPE when accessing them through the servlet API.

20.4.1 PortletSession Interface Methods

The PortletSession interface methods getCreationTime, getId, getLastAccessedTime, getMaxInactiveInterval, invalidate, isNew and setMaxInactiveInterval must provide the same functionality as the HttpSession interface methods with identical names.

The PortletSession interface getAttribute, setAttribute, removeAttribute and getAttributeNames methods must provide the same functionality as the methods of the HttpSession interface with identical names. The getAttributeMap method has no correspondence to an HttpSession method. It returns an immutable Map<String, String[]> containing the current attributes.

The behavior of the latter methods is influenced by the portlet session scope. Each of the methods provides a variant that accepts a portlet session scope argument and one that does not. The variant that does not accept a portlet session scope argument must assume PORTLET_SCOPE portlet session scope. The portlet container must encode and decode the attribute name depending on the portlet session scope transparently for the portlet as described in Section 20.4.

The portlet container must execute the setAttribute and removeAttribute methods as atomic operations. The portlet container is responsible for handling concurrent writes to avoid inconsistency in portlet session attributes.

An example of setting a portlet session attribute follows.

```
PortletSession session = request.getSession(true);
URL url = new URL("http://www.foo.com");
session.setAttribute("home.url",url,PortletSession.APPLICATION_SCOPE);
session.setAttribute("bkg.color","RED",PortletSession.PORTLET_SCOPE);
```

20.5 *Modifying Objects in the Portlet Session*

The developer should consider the portlet execution phase when modifying portlet session attributes in order to avoid concurrency issues and inconsistent data.

Modifying or setting PORTLET_SCOPE portlet state scoped attributes during the action phase will likely not create any concurrency issues, since the attribute is scoped to the portlet window and generally only a single request from a specific portlet window can be processed.

Modifying or setting APPLICATION_SCOPE portlet state scoped attributes during the action phase is more likely to create concurrency issues, since these attributes are shared with other portlets and web components that may run in parallel and change the same attribute.

The portlet API does not prevent portlets from modifying portlet session attributes during the render or resource phases. However, developers are in general discouraged from doing so.

Portlet session attributes should only be modified during the resource phase if the client request was submitted using the HTTP POST, PUT, or DELETE method.

Modifying portlet session attributes during the render phase or during resource phase processing initiated through the HTTP GET method is strongly discouraged as it makes rendering non-idempotent. This is especially true for APPLICATION_SCOPE attributes, since they can be shared across portlets and other web components.

20.6 Reserved HttpSession Attribute Names

Session attribute names starting with "`javax.portlet.`" are reserved for usage by the Portlet Specification and for portlet container vendors. A portlet container vendor may use this reserved namespace to store implementation-specific components. Application developers must not use attribute names starting with this prefix.

20.7 Session Timeouts

The portlet session follows the timeout behavior of the servlet session as defined in the *Servlet Specification Version 3.1, Section .7.5 Session Timeouts*.

20.8 Last Accessed Times

The portlet session follows the last accessed times behavior of the servlet session as defined in the *Servlet Specification Version 3.1 Section .7.6 Last Accessed Times*.

20.9 Important Session Semantics

The portlet session follows the same semantic considerations as the servlet session as defined in the *Servlet Specification Version 3.1, Section .7.7 Important Session Semantics*.

These considerations include *Threading Issues*, *Distributed Environments,* and *Client Semantics*.

Chapter 21 Managed Bean Support

Support for Contexts ad Dependency Injection for Java (CDI) is part of the Java EE web profile. The Portlet Specification provides support for managed beans through portlet instantiation, custom scopes for CDI, and by defining injectable portlet artifacts.

21.1 Portlet Instantiation

The portlet must have a default constructor in order to be recognized as a valid CDI managed bean class. When CDI is available, the portlet container must instantiate the portlet through the CDI managed bean container in order to allow the portlet to use CDI features.

21.2 Custom Scopes

The Portlet Specification provides two custom scopes for use with CDI managed beans.

21.2.1 Portlet Session Scope

The portlet session scope is a passivating scope that associates managed beans with the portlet session rather than to the servlet session.

The CDI `@SessionScoped` built-in scope associates managed beans with the servlet session. The Portlet Specification introduces the `@PortletSessionScoped` annotation, which the portlet developer can use to designate beans that are to be placed into the portlet session.

The `@PortletSessionScoped` annotation provides the single `value` element that specifies the portlet scope into which the managed bean is to be placed. See Section 20.4 Binding Attributes to a Portlet Session for discussion of the portlet scopes. Possible values are:

- `PortletSession.PORTLET_SCOPE` – places the managed bean into the portlet session.
- `PortletSession.APPLICATION_SCOPE` – places the bean into the portlet application scope. This scope has the same effect as the CDI @SessionScoped built-in scope.

The default value is `PortletSession.PORTLET_SCOPE`.

21.2.2 Portlet State Scope

The portlet state scope is a passivating scope that associates managed beans with the portlet state. The bean state is stored as a render parameter within the portlet state.

The Portlet Specification introduces the `@PortletStateScoped` annotation, which the portlet developer can use to designate beans that are to be stored as part of the portlet state. To enable passivation under observance of the portlet phase model and to allow the managed bean state to be stored in a parameter values array, the managed bean annotated with `@PortletStateScoped` must implement the `PortletSerializable` interface. If the `@PortletStateScoped` annotation is applied to a managed bean that does not implement `PortletSerializable`, the portlet container must not place the portlet in service.

The @PortletStateScoped annotation provides the following elements.

- The `paramName` optional element specifies a render parameter name under which the managed bean state is to be stored. If no parameter name is specified, the portlet container must assign a parameter name that is unique within the portlet application.

  The portlet container must make the managed bean state available through the `RenderParameters` object and through the client-side portlet API by the specified or assigned render parameter name.

  If the specified render parameter name matches a public render parameter name specified in the portlet application configuration, the portlet container must store the managed bean state as the public render parameter value.

The PortletSerializable interface defines the methods `serialize` and `deserialize`. The `serialize` method returns a `String[]` object, while the `deserialize` method accepts a `String[]` object as an argument.

The portlet developer must implement the `serialize` method to return a `String[]` object that contains all information necessary to reconstruct the managed bean state. The portlet developer must implement the `deserialize` method to reconstruct the managed bean state from the given `String[]` object.

In accordance with the rules for updating portlet state, the portlet container must serialize the `@PortletStateScoped` managed bean state using the `PortletSerializable` interface `serialize` method during the action phase after each portlet action request or event request execution that uses the managed bean. The portlet container must store the serialized bean state as a render parameter in the portlet state using the associated render parameter name.

The portlet container must not serialize and store the managed bean state after render phase or resource phase execution. The portlet container must discard any changes made to the managed bean state during these execution phases.

When the managed bean is first accessed during portlet request processing, the portlet container must retrieve the stored bean state under the associated render parameter name from the portlet state and provide it as the argument to the `PortletSerializable` interface `deserialize` method.

A @PortletStateScoped managed bean may not be further differentiated through use of qualifiers, since doing so could lead to naming conflicts between the associated render parameter names.

21.3 Portlet Predefined Beans

The portlet container must make certain portlet artifacts available as predefined beans for injection into portlet classes. The portlet container will generally do this by implementing appropriate CDI producer methods or fields for the artifacts, although the exact mechanism for doing so is an implementation detail not covered by this specification.

The bean scope of the injectable objects must be of the CDI built-in scope type `@RequestScoped` so that they won't become stale or conflict with corresponding objects from other portlets when used within common libraries. Also, many of the objects are tied to the portlet request processing lifecycle and become invalid when request processing completes.

The portlet should not override the bean scope assigned by the portlet container at the injection point, as the effect will be undefined and likely undesirable.

Some of the injectable objects only exist within certain portlet processing phases. For example, the `ActionRequest` object only exists during action request processing, while the `RenderRequest` object only exists during render request processing.

The portlet container producer method or field must produce or contain null if accessed during portlet request execution during which the portlet artifact does not logically exist. The portlet developer should note that the CDI container will throw a runtime exception if the corresponding injection point is accessed in this case.

Some of the injectable objects are of the same bean type. For example, the portlet namespace and context path but return String objects. Such objects must be distinguished through use of qualifiers.

The Portlet Specification defines the `URLFactory` interface that allows URLs to be created during render and resource request processing. The URLFactory object is only available through injection. It provides the following methods that correspond to the MimeResponse interface methods with the same method signature: `createRenderURL`, `createActionURL`, `createResourceURL`, `encodeURL`. See Section 16.5 `MimeResponse` Interface.

The portlet container must provide the predefined beans defined in the table below. If the bean type differs from the artifact name, the actual bean type is specified in parentheses.

The portlet container must produce named beans that can be used in a JSP or a JavaServer™ Faces Facelet. The table below provides the required EL names.

Artifact	Bean EL Name	Qualifier	Valid during
`PortletConfig`	`portletConfig`	-	all
`PortletRequest`	`portletRequest`	-	all
`PortletResponse`	`portletResponse`	-	all
`ActionRequest`	`actionRequest`	-	action
`ActionResponse`	`actionResponse`	-	action
`RenderRequest`	`renderRequest`	-	render
`RenderResponse`	`renderResponse`	-	render
`EventRequest`	`eventRequest`	-	event
`EventResponse`	`eventResponse`	-	event
`ResourceRequest`	`resourceRequest`	-	resource
`ResourceResponse`	`resourceResponse`	-	resource
`PortletState`	`portletState`	-	all
`MutablePortletState`	`mutablePortletState`	-	action, event
`RenderParameters`	`renderParameters`	-	render
`MutableRenderParameters`	`mutableRenderParameters`	-	action, event
`ActionParameters`	`actionParameters`	-	action
`ResourceParameters`	`resourceParameters`	-	resource
`PortletMode`	`portletMode`	-	all

Artifact	Bean EL Name	Qualifier	Valid during
WindowState	windowState	-	all
PortletPreferences	portletPreferences	-	all
Cookies	cookies	-	all
PortletSession	portletSession	-	all
Locale	locale	-	render, resource
Locales	locales	-	all
Namespace (String)	namespace	@Namespace	all
ContextPath (String)	contextPath	@ContextPath	all
WindowID (String)	windowID	@WindowId	all
URLFactory	urlFactory	-	render, resource

Chapter 22 Client-Side Support

Portlet Specification 2.0 introduced support for Ajax requests through resource serving. The resource requests are initiated through resource URLs that are tied to a specific portlet state. Portlet Specification 3.0 goes beyond this by allowing portlet JavaScript code running on the client to update the portlet state and obtain resource URLs corresponding to the resulting page state. Portlet Specification 3.0 improves client-side support for portlets by introducing a dedicated client-side JavaScript API for portlet support.

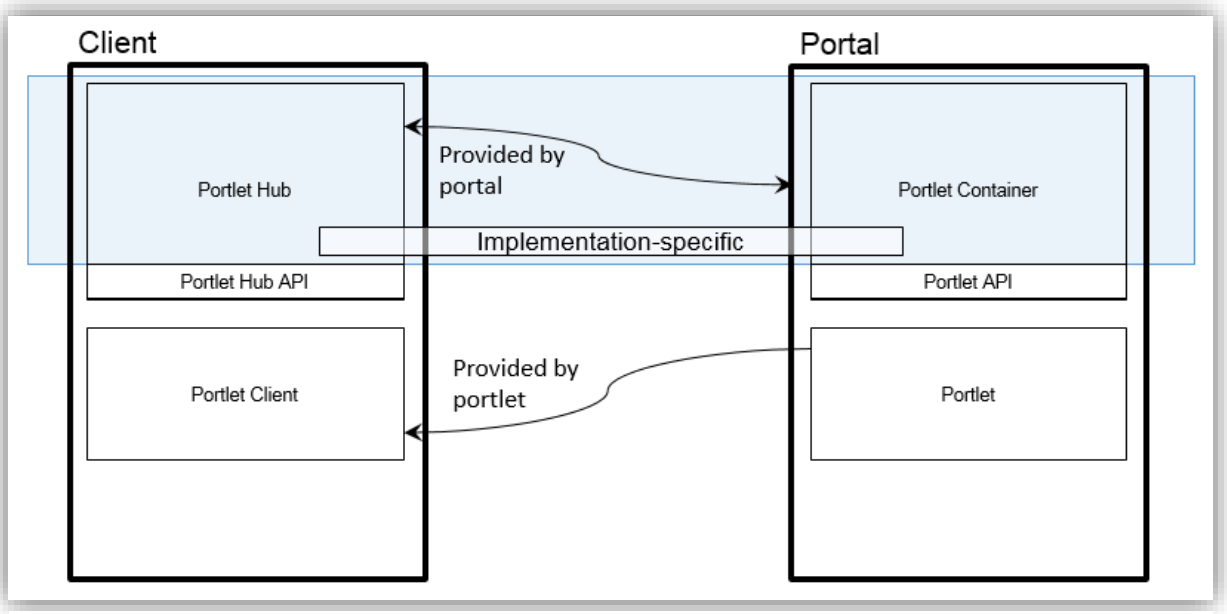


Figure 22–1 The Portlet Hub

The client-side portlet API is known as the portlet hub. The portlet hub represents the portal on the client. Portlet Specification 3.0 defines the API and its semantics, but does not define its implementation details. The portlet hub implementation along with any necessary communication protocols between the portlet hub and the portal server are implementation-specific and are not covered by this specification.

The portlet hub is a JavaScript module provided by the portal implementation that manages the portlet state for all portlets on the page. The manner in which the portlet hub is configured, packaged, and made available on the portal page is implementation specific.

A portlet can provide JavaScript code known as the portlet client that registers itself with the portlet hub. Once registered, the portlet hub informs the portlet client through a callback function whenever the portlet state for that portlet changes.

The portlet client can use portlet hub methods to set the portlet state, to execute portlet actions, and to obtain resource URLs that correspond to the current page state without causing a page refresh. The portlet hub thus allows the portal to serve pages containing many portlets that change their state and communicate with one another using portlet concepts such as portlet actions, public render parameters, and portlet events, while maintaining an overall single-page-application-like experience for the overall portal page.

The portlet hub JavaScript API documentation is provided as part of the portlet API documentation.

22.1 Basic Concepts

The JavaScript API is designed using standard JavaScript constructs so as to place as few restrictions as possible on the vendor implementing the portlet hub. Similarly, it places as few restrictions as possible on the portlet client code provided by the portlet. The portlet hub and the portlet client are bound only by the portlet hub API definition. Either or both can be implemented in plain JavaScript or with the help of a JavaScript library.

The JavaScript namespace beginning with 'portlet' is reserved for use by the portlet hub. The portlet hub makes its register method available under the name 'portlet.register'. Beyond reservation of this name, the portlet hub imposes no further namespace restrictions.

The Portlet Specification places no restrictions on portlet client packaging. The portlet client JavaScript code can be rendered inline in the portlet markup or it can be packaged in a separate file. The Portlet Specification places no restrictions on how the portlet client JavaScript code is structured.

The Portlet Specification describes client-side support for version 3.0 portlets only. Such portlets have a version 3.0 portlet descriptor or use the `@PortletConfiguration` configuration annotation defined in Portlet Specification Version 3.0. Support for version 2.0 portlets is left to the portal and portlet hub implementation.

The Portlet Specification does not describe how portlets not participating in the portlet hub client-side support are to be handled. However, the Portlet Specification recommends that the portlet hub initiates a page refresh if a portlet hub interaction results in a portlet state change for a portlet that does not participate in portlet hub client-side support. Otherwise, the non-participating portlet might display stale data.

22.1.1 Promises

The portlet hub makes use of promises to help with asynchronous operations. Promises are part of the ECMA Script standard[15] and are supported by many browsers. However, some browsers do not support promises. The portal must provide a backfill if such browsers are to be supported. The ECMA Script standard `Promise` support is distinct from `Promise` support provided by some JavaScript libraries. The portlet hub must provide `Promise` support that is compatible with the ECMA Script standard.

When the portlet client calls a portlet hub function and an error condition occurs immediately, the function can throw an exception to indicate the problem.

When the portlet client calls a portlet hub function that can potentially require communication with the portal server to complete, the portlet hub returns a `Promise`. The portlet hub implementation is not required to communicate with the server in such situations, but can do so if necessary. When the operation completes, the portlet hub can resolve the pending `Promise` in one of two ways:

1. It can *fulfill* the `Promise` if the operation was successful, passing the requested information back to the portlet client.

[15] See ECMAScript® 2015 Language Specification (ES6), at http://www.ecma-international.org/ecma-262/6.0/

2. It can *reject* the `Promise` if the operation was not successful. In this case, the portlet hub must pass an `Error` object back to the portlet client. The `Error` object should contain an indication about the error that occurred.

In the description that follows, the `reject` path might be left out for clarity when the portlet hub returns a `Promise`. In such cases, the reader should note that a returned `Promise` can always be rejected.

22.1.2 Changing the Portlet State

The portlet client can use portlet hub functions to initiate state changes. The portlet client can set public and private render parameters as well as the portlet mode and window state.

In addition, the portlet client can submit a portlet action request that uses HTTP POST semantics. The portal will execute the portlet Action Phase and Event Phase processing on the server and return the updated page state to the portlet hub.

After the requested state change has been performed, the portlet hub will usually provide each affected portlet client with its updated state information.

However, regardless of whether the state change was initiated by setting parameters or through a portlet action, the portal may respond by completely refreshing the page. The portal may do so in order to support portlets that are affected by the state change but do not participate in the portlet client-side support, due to configuration settings, or for implementation-specific reasons.

If the portal responds to a state change request by refreshing the page, the portlets will not be updated with new page state information before the page refresh is carried out.

22.1.3 Receiving Portlet State Updates

When a state change occurs that affects a portlet, the portlet hub informs the affected portlet client of its new state through use of a callback function. The change causing the update does not necessarily need to be initiated by the portlet client itself.

For example, when portlet A changes a public render parameter used by portlet B, the portlet hub will inform both the portlet A and the portlet B clients of that change.

22.1.4 Portlet Client Events

Portlet client events consist of an event type and an event payload. Both are defined by the portlet clients themselves.

Portlet client events have no connection to the server-side portlet event mechanism.

The portlet hub provides utility functions that enable the portlet client to dispatch and listen for portlet client events.

22.1.5 Error Handling

When the portlet hub can recognize an error during function execution, the error will be reported to the portlet client through an exception.

However, some methods initiate work that is performed asynchronously. Errors that occur during asynchronous processing will be reported to the portlet client by rejecting a Promise if possible. If the problem cannot be reported to the portlet client by rejecting a promise, the

portlet hub will inform the portlet client of the error condition through the `onError` callback function.

22.1.6 Important Considerations

The portlet hub calls the portlet client callback functions in several situations as described above. When the portlet hub calls the portlet client, the portlet client may navigate to a different page or may initiate another change to the portlet state that could potentially cause a page refresh.

Due to this behavior, the delivery of neither portlet state updates nor portlet client events can be guaranteed.

22.1.7 Blocking Operations

The portlet hub implementation may optionally provide support for blocking operations.

The portlet hub provides for orderly state transitions by allowing only a single blocking operation (`action`, `setPortletState`, `startPartialAction`) to be active at any one time.

The state transition is considered to be active from the initial portlet client call to one of the blocking operations until the portlet hub has performed the requested state change and has informed all of the affected portlet clients by firing the corresponding `onStateChange` events.

This has the following implications:

- It is not possible to initiate a sequence of blocking operations.
- For example, once a portlet client calls the `setPortletState` method, it cannot call any additional blocking method until after its `onStateChange` listener function has been called.
- It is not possible to initiate a blocking operation during execution of the `onStateChange` listener function, since execution of that function belongs to the preceding state change operation.

The portlet client may use the `isInProgress` method to determine if a blocking operation is in progress. If blocking operations are not supported by the portlet hub implementation, this method must always return `false`.

22.2 Portlet Parameters and Portlet State

The portlet state concept and the Java API for accessing the portlet state was introduced in Chapter 13 Portlet State. This section introduces the portlet hub JavaScript API for handling portlet state.

The idea of portlet state is central to the portlet hub concept. The portlet hub manages the overall page state on the client. The page state consists of the portlet state of all portlets on the page. The portlet hub informs the portlet client when the portlet state changes. This could occur as the result of a server-side action, for example. The portlet client can also make changes such as setting render parameters through the portlet hub.

The portlet state consists of the private and public render parameters, the portlet mode, and the window state. The portlet state is modeled by JavaScript objects that contain the necessary information along with functions that allow the portlet state to be read and updated.

The `PortletParameters` object is a JavaScript object whose property names correspond to parameter names and whose property values are string arrays. A property value may be null or may be an empty array. An example property object may appear as follows:

```
{
   'parm1' : ['val1'],
   'parm2' : ['val2', 'val3']
}
```

The portlet client uses property objects to pass action and resource parameters to portlet hub functions. A portlet parameters object also appears within the portlet state object to represent the render parameters.

The `PortletState` object contains a property named ‘parameters’ representing the render parameters, a property named ‘portletMode’ representing the portlet mode, and a property named ‘windowState’ representing the window state. In addition, it contains functions for accessing theses data items. An example for the data portion of the portlet state object might appear as follows:

```
{
   'parameters' : {
      'parm1' : ['val1'],
      'parm2' : ['val2', 'val3']
   },
   'portletMode' : 'VIEW',
   'windowState' : 'NORMAL'
}
```

The table below describes the functions available on the portlet state object.

Function	Description
`clone()`	Returns a new copy of this object
`setPortletMode(pm)`	Sets the portlet mode to the specified value. The strings defined by the `PortletConstants` object should be used to specify the portlet mode.
`getPortletMode()`	Returns the current portlet mode
`setWindowState(ws)`	Sets the window state to the specified value
`getWindowState()`	Returns the current window state The strings defined by the `PortletConstants` object should be used to specify the window state.
`setValue(n, v)`	Sets a parameter with name n and value v. The value v may be a string or an array.
`setValues(n, v)`	Sets a parameter with name n and value v. The value v may be a string or an array.
`getValue(n, d)`	Gets the string parameter value for the name n. If n designates a multi-valued parameter, this function returns the first value in the

Function	Description
	values array. If parameter n is undefined, the function returns the optional default value d.
`getValues(n, d)`	Gets the string array parameter value for the name n. If parameter n is undefined, the function returns the optional default value array d.
`remove(n)`	Removes the parameter with name n.

22.3 Scenarios

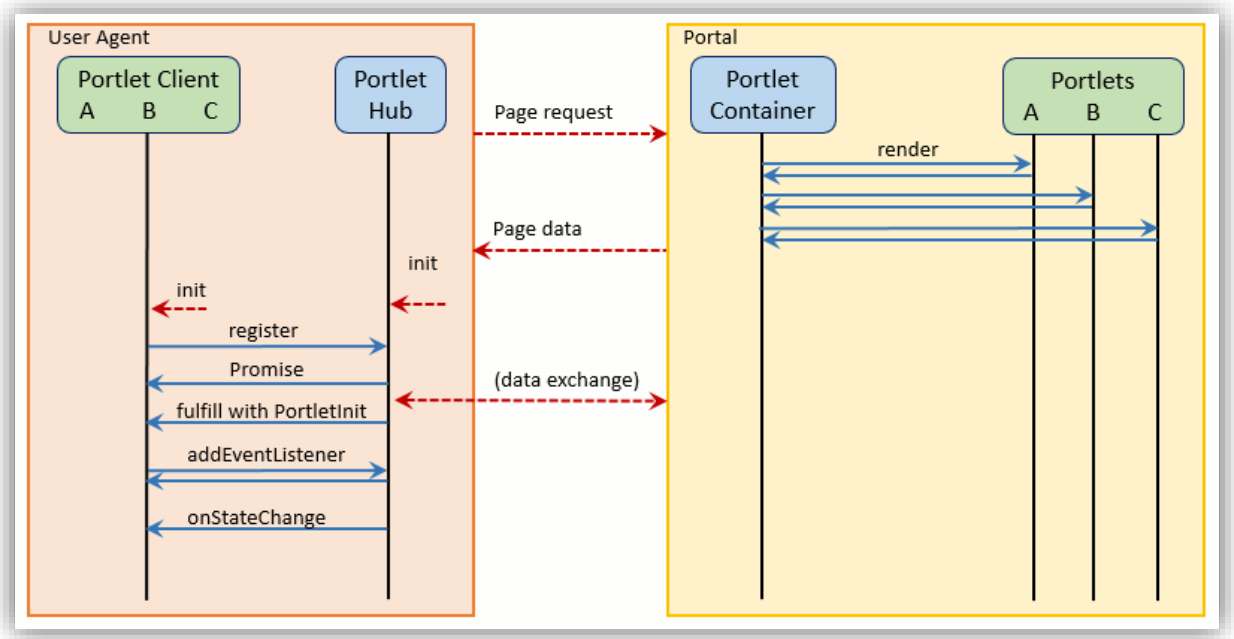
The next sections illustrate the concepts behind the portlet hub through use of sequence diagrams. In the sequence diagrams in the sections that follow, communication or method calls not covered by the Portlet Specification is represented by dashed red lines (- - - -). Communication or method calls covered by the specification are represented by solid blue lines (——). Illustrative text showing potential or optional communication between the portlet hub and the portal server is shown in parentheses (like this).

For details on the portlet hub methods, see Section 22.4 Portlet Hub API.

22.3.1 Initial Page Load

When the page is initially loaded, the portlet hub and the portlet clients must be loaded and initialized. The following figure illustrates the page loading and initialization sequence.

Initialization is the same for each portlet client. The sequence is explained in the figure below using portlet B as an example.



1. The sequence begins when the user agent issues a request for a portal page that makes use of the portlet hub.
2. The portal causes the portlets on the page to be rendered and returns the page data containing the page markup, the portlet hub code, and the portlet client code for each portlet back to the user agent.
3. The portlet hub and the portlet client are initialized and begin execution. The method through which the initialization takes place is outside the scope of this specification. However, the portlet hub must ensure that its `portlet.register` function is available in the JavaScript global namespace before the portlet clients are initialized.
4. Each portlet client registers itself with the portlet hub by calling the `portlet.register` function and passing its portlet ID as an argument. The portlet ID is the unique namespace string returned by the `PortletResponse` interface `getNamespace` method.
5. The portlet hub must return a `Promise` object in order to allow potential communication with the portal.
6. The portlet hub fulfills the `Promise` by passing a `PortletInit` object to the portlet client.

   The `PortletInit` object represents the actual portlet hub programming interface for

Figure 22–2 Initial Page Load

   use by the portlet. It contains all portlet hub methods that can be used after initialization. See Section **Error! Reference source not found. Error! Reference source not found.**.

   The portlet hub must associate the portlet ID provided to the `register` function with the specific PortletInit object returned to the portlet client. This is done for two reasons:

   a. To make it more convenient for the developer.
   b. To make it more difficult for rogue code to act on behalf of the portlet.

   Whether or not, or under which circumstances, the `register` function may be called multiple times for the same portlet ID is left to the implementation. The portlet developer should assume that the `register` function can only be called a single time and should maintain a reference to the returned `PortletInit` object for future use.
7. The portlet client uses the `PortletInit` object `addEventListener` method to add a listener with the type containing the string '`portlet.onStateChange`' and providing the appropriate callback function. The portlet hub must invoke the `onStateChange` callback function whenever the portlet state for the registered portlet changes.
8. The portlet client may additionally use the `PortletInit` object `addEventListener` method to add a listener with the type containing the string '`portlet.onError`' and providing the appropriate callback function. The portlet hub must invoke the `onError` callback function to report an error that cannot be reported by an exception or by rejecting a promise.
9. After the portlet client adds an `onStateChange` listener, the portlet hub must fire an `onStateChange` event to that portlet, passing the current `PortletState` object as the event payload in order to provide the portlet with its initial portlet state information.

The following example shows portlet client initialization code:

```
// Handler for onStateChange event
update = function (type, state) {
   // The type argument will be set to the string 'portlet.onStateChange'
   // The state argument will be a PortletState object
};

// Register portlet with Portlet Hub.
// Add listener for onStateChange event.
portlet.register(pid).then(function (pi) {
   hub = pi;      // Store the PortletInit object
   hub.addEventListener("portlet.onStateChange", update);
});
```

22.3.2 Singe Portlet Update

In this scenario, a single portlet updates its private render parameters and obtains a resource corresponding to the new page state in order to update its user interface.

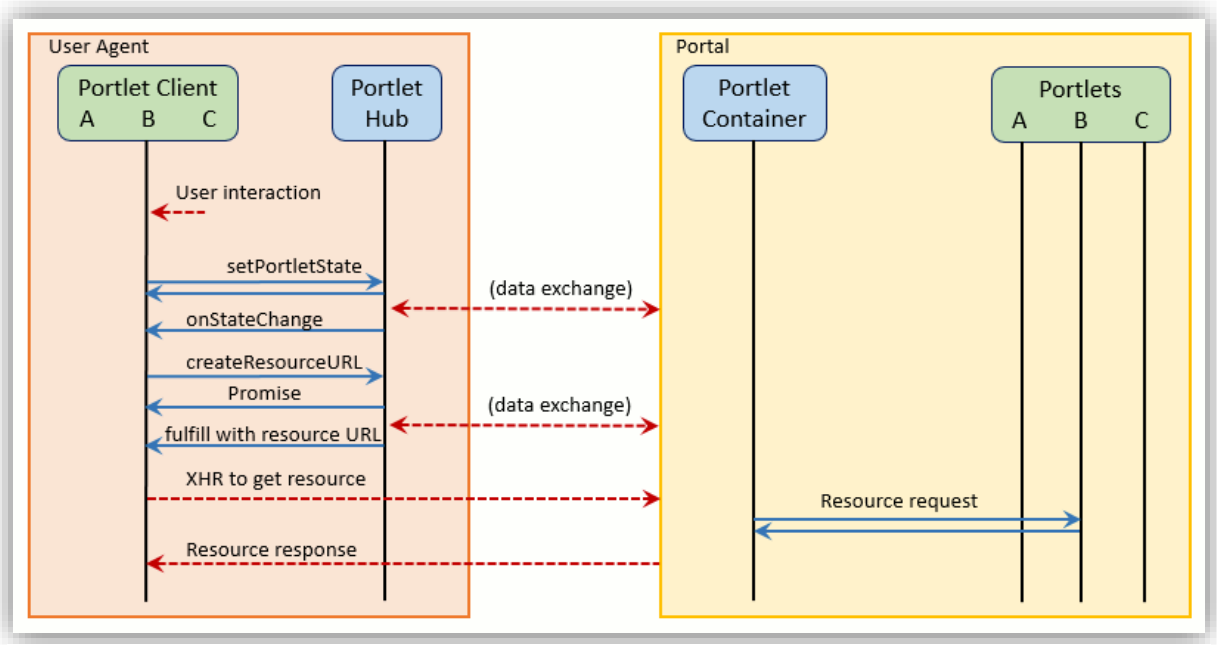


Figure 22–3 Single Portlet Update

1. The scenario begins when a user interaction with portlet B requires a portlet state update, such as an update to private parameters that does not affect other portlets on the page.
2. The portlet updates its `PortletState` object and calls the portlet hub `setPortletState` method.
3. This can potentially cause a data exchange between the portlet hub and the portal.
4. The portlet hub accepts the update and fires an `onStateChange` event to the portlet to confirm the state change.
5. The portlet needs a new resource based on the new state, so it invokes the `createResourceURL` method with any necessary resource parameters and cacheability options.
6. The portlet hub returns a `Promise` for the resource URL.
7. This can potentially cause a data exchange between the portlet hub and the portal.

8. The portlet hub fulfills the promise by passing the resource URL containing the current page state as required to the portlet client.
9. The portlet client uses a native XHR or its JavaScript library function of choice to fire a request to the URL.
10. The portlet container executes resource request processing for portlet B using the page state and resource parameters provided through the resource URL.
11. The portal returns the resource response to the portlet client.

22.3.3 Public Render Parameter Update

In this scenario, portlet B updates a public render parameter that is also used by portlet A.

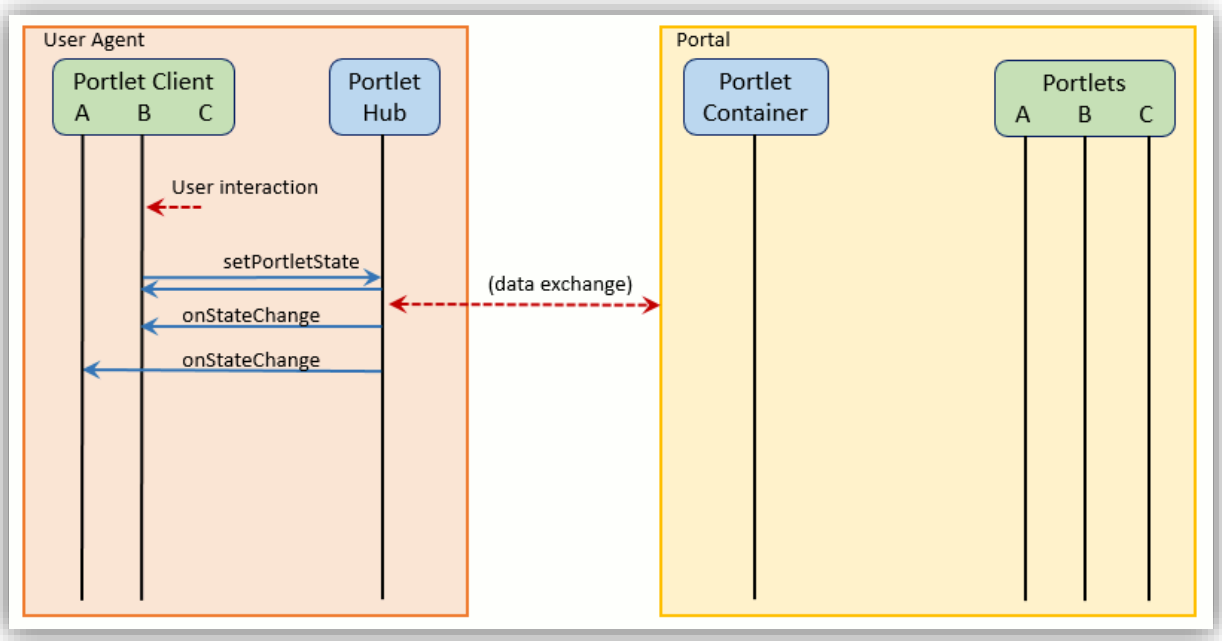


Figure 22–4 Public Render Parameter Update

1. The scenario begins when a user interaction with portlet B requires a portlet state update that affects a public render parameter also used by portlet A.
2. Portlet B updates its `PortletState` object and calls the portlet hub `setPortletState` method.
3. This can potentially cause a data exchange between the portlet hub and the portal.
4. The portlet hub accepts the update and fires an `onStateChange` event to portlet B to confirm the state change.
5. The portlet hub fires an `onStateChange` event to portlet A to inform that portlet about the state change.
6. During onStateChange execution, both affected portlets can use portlet hub methods to create resource URLs and can use JavaScript library functions to update the user interface.

22.3.4 Portlet Action

In this scenario, portlet B executes a portlet hub action that causes an event processing sequence on the server, resulting in portlet state updates for portlets A and B.

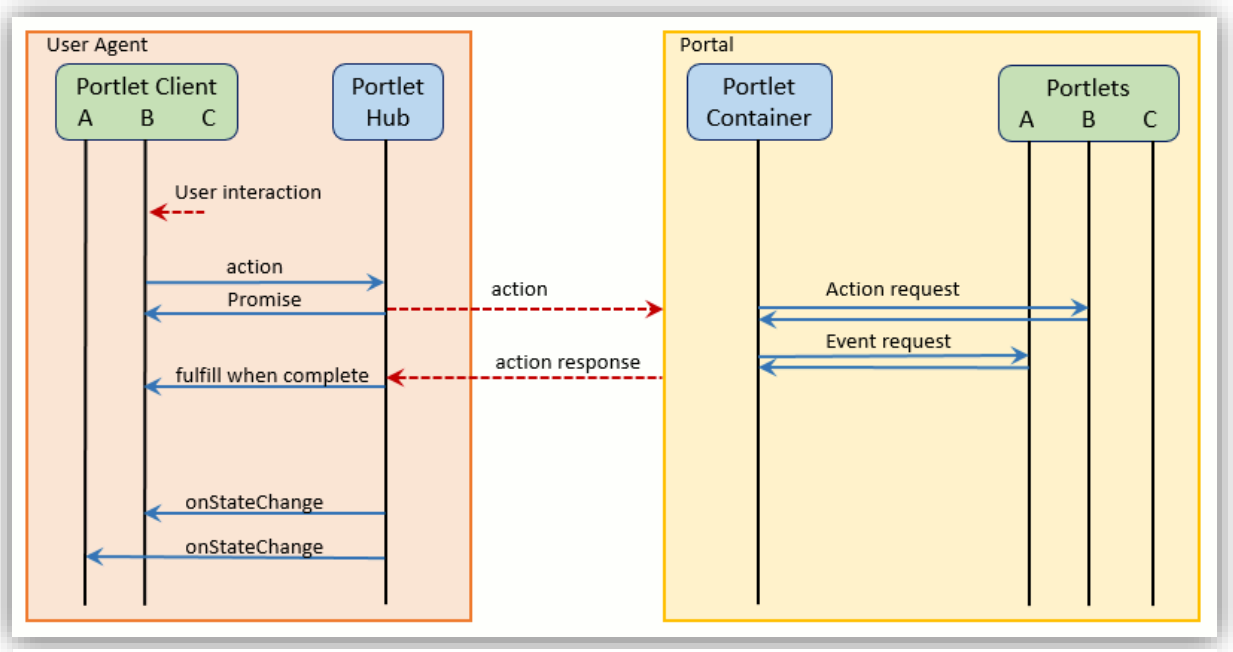


Figure 22–5 Portlet Action

1. The scenario begins when a user interaction with portlet client B initiates a portlet action, such as a form submission, that causes a server-side event affecting portlet A.
2. Portlet client B invokes the portlet hub action method with any necessary action parameters and form parameter arguments.
3. This causes the portlet hub to send an action request to the portal.
4. The portlet container fires an action request for portlet B on the server.
5. Portlet B executes the action request and fires an event.
6. The portal routes the event to portlet A, which performs event processing.
7. Instead of rendering the page or redirecting the client to the new resulting render URL, the portal transmits the new page state containing updated information for portlets A and B to the portlet hub.
8. The portlet hub fulfills the action `Promise`.
9. The portlet hub fires an `onStateChange` event to portlet client B with the updated `PortletState` object.
10. The portlet hub fires an `onStateChange` event to portlet client A with the updated `PortletState` object.
11. During onStateChange execution, both affected portlets can use portlet hub methods to create resource URLs and can use JavaScript library functions to update the user interface.

22.3.5 Partial Action

The partial action was introduced to provide client-side support for action-based frameworks such as JSF. Such frameworks must often be in control of submitting the request and processing the response in order to work correctly.

The partial action sequence allows the portlet (or portlet bridge) client-side code to obtain an action URL that the framework can use to execute the request and obtain a response. The partial action response also contains any markup produced by resource request processing for the partial action target portlet.

In this scenario, portlet B executes a partial action that causes an event processing sequence on the server, resulting in portlet state updates for portlets A and B and markup updates for portlet B.

In the figure below, portlet client B is colored to indicate that it might be executing framework bridge code, such as the JSF Portlet Bridge, to work with the framework.

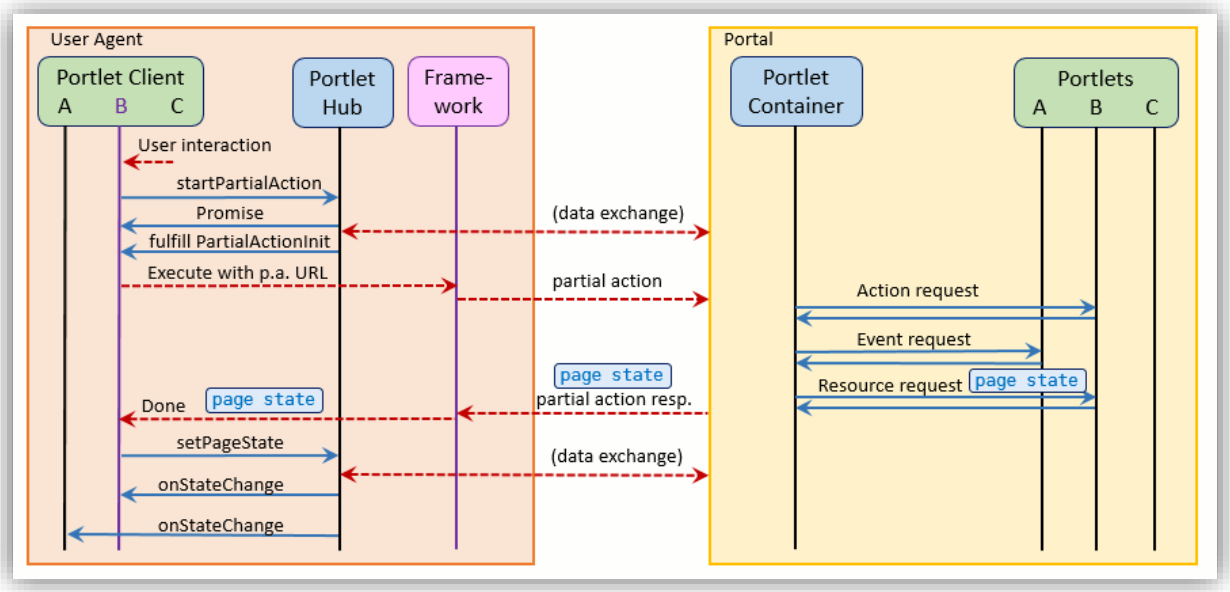


Figure 22–6 Partial Action

1. The scenario begins when a user interaction with portlet client B initiates an action that uses the framework, such as a form submission, that that causes a server-side event affecting portlet A.
2. Portlet client B invokes the portlet hub partial action method with any necessary action parameters.
3. The portlet hub returns a `Promise`.
4. The portlet hub potentially communicates with the portal.
5. The portlet hub fulfills the Promise with a `PartialActionInit` object.

   The PartialActionInit object contains a URL and a callback function. The URL is called the partial action URL, and when it is fired, it invokes the partial action processing sequence on the portal server. The callback function is called the `setPortletState` function, and it takes a string portlet state token as the only argument.

Later in the sequence, the portlet client invokes the callback function, passing the page state token provided by the portlet container as an argument, to conclude the partial action processing sequence.

6. Portlet client B uses the partial action URL with the framework to invoke partial action processing.
7. The portlet container fires an action request for portlet B on the server.
8. Portlet B executes the action request and fires an event.
9. The portal routes the event to portlet A, which performs event processing.
10. Instead of rendering the page or redirecting the client to the new resulting render URL, the portal invokes resource request processing for portlet B, setting the `PAGE_STATE` request attribute with the appropriate value for the page state token (see Section 15.1.2.6 The Page State Request Attribute).

    The portlet must transport the page state token as part of the resource response to the client and pass it unchanged to the portlet hub. The page state token is a `String` object that can contain any value, including the empty string or null.
11. The portal sends the partial action response, which includes any data resulting from resource request processing for portlet B, back to the framework.
12. The framework concludes its work and passes the page state token to portlet B.
13. Portlet B calls the `setPageState` function, passing the page state token to the portlet hub.
14. The portlet hub updates its internal state, which could potentially require communication with the portal.
15. The portlet hub fires an `onStateChange` event to portlet client B with the updated `PortletState` object.
16. The portlet hub fires an `onStateChange` event to portlet client A with the updated `PortletState` object.
17. During onStateChange execution, both affected portlets can use portlet hub methods to create resource URLs and can use JavaScript library functions to update the user interface as necessary.

22.4 Portlet Hub API

The portlet hub API consists of the `portlet.register` method along with the methods provided by the `PortletInit` object that are summarized in the following table. This section describes the API method behavior in detail.

Property	Returns	Description
action	Promise	Initiates a portlet action.
addEventListener	object	Adds a listener function for specified event type.
createResourceUrl	Promise	Returns a promise for a resource URL.
dispatchClientEvent	number	Dispatches a client event.

Property	Returns	Description
isInProgress	boolean	Tests whether a blocking operation is in progress.
newParameters	PortletParameters	Returns new PortletParameters object.
newState	PortletState	Returns a new PortletState object.
removeEventListener	n/a	Removes a previously added listener function.
setPortletState	n/a	Sets the portlet state. The argument must be a PortletState object.
startPartialAction	Promise	Starts partial action processing.

22.4.1 Portlet.register()

This method registers a portlet client with the portlet hub and returns a Promise object that is fulfilled with the PortletInit object for the portlet as argument when the registration has been completed.

The portlet client calling this method must provide a valid portlet ID. The portlet ID is identical to the unique namespace provided by the portal server for the portlet. The portlet hub should validate the portlet ID and throw an exception or reject the `Promise` if the portlet ID is invalid.

The portlet hub implementation may choose to disallow multiple calls to the register method for a given portlet ID. The portlet developer should assume that the register method may only be called once and should store the `PortletInit` object returned through the `Promise` for later use.

22.4.2 action(actParams, element)

This method initiates a portlet action using the specified action parameters and element arguments and returns a `Promise` that is fulfilled with no argument when the action completes.

When the action has successfully completed, the portlet hub must provide the updated `PortletState` object to the portlet client through the `onStateChange` listener function. . The portlet hub must also call the `onStateChange` callback function for every portlet client whose state has changed as result of this operation.

However, the portlet hub or portal may also completely refresh the page as a response to the action. This may occur in order to support portlets on the page that do not participate in the Portlet 3.0 Ajax support or due to configuration settings, for example. If the page is completely refreshed, it will be rendered according to render parameters set on the server.

The `actParams` argument represents action parameters, which are optional parameters attached to an action URL in addition to any portlet state values that may be present. Action parameters do not influence the portlet state. The portlet hub and portal must make the action parameters set through the portlet hub action method available on the server through the `ActionParameters` interface. See Section 12.3 Action Parameters.

The `actParams` argument must be a `Parameters` object containing properties representing parameter names whose values must be an array of string values, as described in Section 22.2

Portlet Parameters and Portlet State. Use of action parameters is optional. If the `actParams` argument is provided, but is not a valid `Parameters` object, the portlet hub must throw an exception.

If optional the `element` argument is present, it must refer to an HTML form to be submitted. The portlet hub must use this form to execute the action. If the `element` argument is provided, but is not a valid HTML form element, the portlet hub must throw an exception.

If the form element is specified, the encoding type must be 'application/x-www-form-urlencoded' or 'multipart/form-data'. The encoding type 'text/plain' is not supported.

If the encoding type is 'multipart/form-data', the submission method must be 'POST'. Form 'INPUT' elements of type 'FILE' are supported.

If the encoding type is 'application/x-www-form-urlencoded', the submission method can be either 'GET' or 'POST'. However, form 'INPUT' elements of type 'FILE' are not supported.

If the `element` argument is not specified, the portlet hub will submit the action to the server by executing a 'POST' with an action URL containing any action parameters provided.

The parameters may be specified in either order, individually, or not at all. Examples of valid calls:

```
action();
action(actParams, element);
action(actParams);
action(element);
```

A portlet `action` is a blocking operation. If the portlet hub implementation supports blocking operations, it must throw an exception if this method called while a blocking operation is in progress.

If this method is called before the portlet client has registered an `onStateChange` listener, this method must throw an exception.

22.4.3 addEventListener(type, func)

This method adds a listener function for specified event type and returns a handle representing the listener. The handle is needed in order to remove the event listener. The portlet client must specify the event type and the callback function that the portlet hub calls when the event occurs.

The portlet hub defines two classes of events - system events and portlet client events:

System events are generated by the portlet hub. They are used to pass portlet-specific information to the registered portlet client. The parameters passed to the system event callback functions are defined by the portlet hub.

Event types prefixed with "portlet." are reserved for system events. System event types may not be specified with a regular expression or wildcard. However, the same event listener may be added for both types of system events.

Only one listener for each type of system event may be added. The following system event types are defined:

- portlet.onStateChange

  Fired when the portlet state changes. In order to participate in the portlet Ajax support, a portlet client must register an onStateChange event listener for this event type.

  After the portlet client adds an event listener for the onStateChange event, the portlet hub will call the onStateChange callback function to provide the portlet client with its

initial state information. However, this will not occur before the call to addEventListener returns.

- portlet.onError

  Fired when an error occurs that cannot be communicated through an exception. In general, this will be some type of asynchronous communication error. In order to receive notification about errors, a portlet must register an onError event listener for this event type.

Portlet Client Events are events initiated by the portlet client through the `dispatchClientEvent` method.

When adding a listener for a portlet client event, the event type may be specified by a regular expression string. The listener will be called for every event type that the regular expression string matches.

Example:

```
myHub.addEventListener("^myCompany\..*", myListener); // registers myListener
for all event types beginning with "myCompany."
```

An event listener can be added for multiple event types. This function returns a handle to identify the unique listener for the event type and for the portlet client associated with the function.

22.4.4 createResourceUrl(resParams, cache)

This method returns a `Promise` for a resource URL with parameters set appropriately for the page state according to the resource parameters and cacheability option provided.

The portlet hub must resolve the promise by providing a URL string that the portlet client may use a native `XMLHttpRequest` or with any appropriate JavaScript framework to retrieve content from the portlet through the server-side serveResource method.

The `resParams` argument represents resource parameters, which are optional parameters attached to a resource URL in addition to any portlet state values that may be present. Resource parameters do not influence the portlet state. The portlet hub and portal must make the resource parameters set when creating the resource URL available on the server through the `ResourceParameters` interface. See Section 12.4 Resource Parameters

The `resParams` argument must be a `Parameters` object containing properties representing parameter names whose values must be an array of string values, as described in Section 22.2 Portlet Parameters and Portlet State. Use of resource parameters is optional. If the `resParams` argument is provided, but is not a valid `Parameters` object, the portlet hub must throw an exception.

The cacheability option designates the degree to which the content to be served can be cached and influences the type of content that can be served. There are three possible values – `FULL`, `PORTLET`, and `PAGE` as described in Section 14.2 The Resource URL.

Specification of cacheability is optional. If the cacheability is not specified, cacheability for the URL will be set to "PAGE".

The method arguments may be specified in either order, individually, or not at all. Examples of valid calls:

```
createResourceUrl();
createResourceUrl(resParams, cache);
createResourceUrl(resParams);
createResourceUrl(cache);
```

22.4.5 dispatchClientEvent(type, payload)

This method dispatches a client event and returns the number of events currently queued for delivery. The portlet client must supply the event type and the payload. Client events of the specified type are queued for delivery to registered event listeners of that type.

The portlet hub must match the event type against the type strings associated with registered event listeners and dispatch an event for each matching listener. The number of matching listeners will be returned.

The event payload is defined by the portlet client. It must be present, but may be of any type or value.

The portlet client may not dispatch event types beginning with the reserved string "portlet.".

The client is responsible for preventing race conditions. For example, a race condition can occur if portlet A dispatches an event to portlet B, causing an event to portlet A, which dispatches again to portlet B, etc.

Event delivery cannot be guaranteed, and may vary according to the situation.

The portlet hub implementation can optionally provide support for the `dispatchClientEvent` method. If support is not provided, the method must perform no operation and must return 0.

22.4.6 isInProgress()

This method tests whether a blocking operation is in progress and if so returns `true`. Otherwise the method must return `false`.

If the portlet hub implementation does not support blocking operations, this method must always return `false`.

The portlet client can use this function to test whether a state change is in progress before initiating a blocking operation.

The developer should note that if the portlet client uses this function to implement a waiting function, the portlet state may be updated due to an `onStateChange` event during the time that the portlet client waits. Also note that the portal may choose to refresh the page as a response to a blocking operation, in which case the waiting function would not complete.

22.4.7 newParameters(p)

This method returns a new `PortletParameters` object. If no argument is provided, an empty `PortletParameters` object will be returned. If an existing `PortletParameters` object is provided as argument, a clone of the input object will be returned. If the argument is provided, but is not a valid `Parameters` object, the portlet hub must throw an exception.

22.4.8 newState(s)

This method returns a new `PortletState` object. If no argument is provided, an empty `PortletState` object will be returned. If an existing `PortletState` object is provided as

argument, a clone of the input object will be returned. If the argument is provided, but is not a valid `PortletState` object, the portlet hub must throw an exception.

22.4.9 removeEventListener(handle)

This method removes a previously added listener function designated by the handle. The handle must be the same object previously returned by the `addEventListener` function.

22.4.10 setPortletState(state)

This method sets the portlet state. The portlet client must provide a PortletState object containing the updated portlet state as an argument.

When the operation has successfully completed, the portlet hub must provide the updated `PortletState` object to the portlet client through the `onStateChange` listener function. The portlet hub must also call the `onStateChange` callback function for every portlet client whose state has changed as result of this operation.

However, the portlet hub or portal may also completely refresh the page as a response to the `setPortletState` operation. This may occur in order to support portlets on the page that do not participate in the Portlet 3.0 Ajax support or due to configuration settings, for example. If the page is completely refreshed, it will be rendered according to render parameters set on the server.

The state argument must be a `PortletState` object as described in Section 22.2 Portlet Parameters and Portlet State. If the argument is not a valid `PortletState` object, the portlet hub must throw an exception.

A portlet `setPortletState` invocation is a blocking operation. If the portlet hub implementation supports blocking operations, it must throw an exception if this method called while a blocking operation is in progress.

22.4.11 startPartialAction(actParams)

This method starts a partial action processing sequence and returns a `Promise` to the portlet client. The `Promise` is fulfilled with a `PartialActionInit` object as argument.

The partial action processing sequence provides client-side support for action-oriented frameworks such as JSF. It allows the framework to obtain URL that it can use to execute an action while remaining in an Ajax paradigm. Such a URL is called a partial action URL.

The `PartialActionInit` object returned through the promise contains a partial action URL and a portlet hub `setPageState` callback function that the framework must call to complete the processing sequence. The partial action URL can be used to initiate an action request. The `setPageState` callback function allows the portlet client to complete the partial action operation by updating the state of all portlet clients on the page that are affected by action and event processing on the server resulting from the partial action.

When the framework code invokes the `setPageState` callback function, the portlet hub must provide the updated `PortletState` object to the portlet client through the `onStateChange` listener function. . The portlet hub must also call the `onStateChange` callback function for every portlet client whose state has changed as result of this operation.

However, the portlet hub or portal may also completely refresh the page as a response to the partial action. This may occur in order to support portlets on the page that do not participate in

the Portlet 3.0 Ajax support or due to configuration settings, for example. If the page is completely refreshed, it will be rendered according to render parameters set on the server.

The `actParams` argument represents action parameters, which are optional parameters attached to an action URL in addition to any portlet state values that may be present. Action parameters do not influence the portlet state. The portlet hub and portal must make the action parameters set through the portlet hub action method available on the server through the `ActionParameters` interface. See Section 12.3 Action Parameters.

The `actParams` argument must be a `Parameters` object containing properties representing parameter names whose values must be an array of string values, as described in Section 22.2 Portlet Parameters and Portlet State. Use of action parameters is optional. If the `actParams` argument is provided, but is not a valid `Parameters` object, the portlet hub must throw an exception.

A portlet `startPartialAction` invocation is a blocking operation. If the portlet hub implementation supports blocking operations, it must throw an exception if this method called while a blocking operation is in progress.

If this method is called before the portlet client has registered an `onStateChange` listener, this method must throw an exception.

22.4.12 onStateChange(type, portletState, renderData)

This describes the `onStateChange` callback function that each portlet client participating in the portlet hub Ajax support must implement.

The Portlet Specification speaks of the ‘`onStateChange` event’, however, the event has different semantics than normally associated with an ‘event’. Usually, an event distributes the same payload to all event subscribers. The portlet hub `onStateChange` event works differently. The portlet hub must fire an `onStateChange` event to each subscribed portlet that experiences a state change. The payload must contain the updated `PortletState` for the specific target portlet and no other.

The portlet client registers an `onStateChange` callback by adding a listener for the `portlet.onStateChange` event type through the `addEventListener` function.

The onStateChange callback function has two mandatory arguments and a third optional argument.

The mandatory `type` argument specifies the event type. This will always be the string ‘`portlet.onStateChange`’.

The mandatory `portletState` argument is the updated `PortletState` object.

Optionally, the portlet hub can provide a third `renderData` argument. This argument contains data that was returned directly in the action response. When the `RenderData` object is available, it contains the same data as would be available through a portlet resource request using the current portlet state with no additional resource parameters and with the resource URL cacheability option set to "PAGE".

Not all portal implementations support this mode of operation, so the portlet client should obtain the resource data through use of a resource URL if the render data is not available.

Chapter 23 Caching

Caching content helps improving the portal response time for users. It also helps reducing the load on servers.

The Portlet Specification defines an expiration based caching mechanism. This caching mechanism is per portlet. Cached content must not be shared across different user clients displaying the same portlet for the private cache scope.

Portlet containers are not required to implement expiration caching. Portlet containers implementing this caching mechanism may disable it, partially or completely, at any time to free memory resources.

23.1 Expiration Cache

Portlets making use of the expiration cache should declare the default expiration time (in seconds) of the expiration cache in the portlet configuration. The portlet container should treat portlets with no default duration defined in the configuration as always expired.

A portlet may programmatically alter the expiration time or caching scope by setting a property in the `RenderResponse` or `ResourceResponse` object using the `EXPIRATION_CACHE` or `CACHE_SCOPE` constant defined in the `MimeResponse` interface in forwarded or included servlets/JSPs. Using Java code, the `CacheControl` object is available via the `MimeResponse` for setting the expiration time or caching scope via the calls `setExpirationTime` or `setScope` methods.

The portlet should set the expiration time or caching scope before writing to the output stream as otherwise the portlet container may ignore the values.

If the expiration property is set to `0`, the returned markup fragment should be treated as always expired. If the expiration cache property is set to `-1`, the cache does not expire. If during render request processing the expiration cache property is not set, the expiration time defined in the deployment descriptor should be used. If the caching scope is set to `PRIVATE_SCOPE` the cached data must not be shared across users. If the caching scope is set to `PUBLIC_SCOPE` the cached data may be shared across users. The private scope is the default scope if no scope is provided in the portlet configuration or via the `RenderResponse` or `ResourceResponse`.

If the content of a portlet is cached, the cache has not expired, and the portlet is not the target of an action or event, the request handling methods of the portlet should not be invoked as part of the client request. Instead, the portlet-container should use the data from the cache.

If the content of a portlet is cached and the portlet is target of request with an action-type semantic (e.g. action or event processing), the portlet container should discard the cache and invoke the corresponding request handling methods of the portlet.

23.2 Validation Cache

Portlets may use validation-based caching as an extension of the expiration-based caching mechanism. Validation-based caching allows portlets to return a validation token together with the markup response and cache expiration time. The portlet can set the validation token on the

`RenderResponse` or `ResourceResponse` via the `ETAG` property from within servlets or JSPs, or via the `CacheControl` interface `setETag` method from within the portlet. The expiration time can be set as described in the previous section. If no expiration time is set, the content should be viewed by the portlet container as expired.

After the content is expired, the portlet container should provide the portlet with the validation token (called `ETag` in HTTP) of the expired content during render or resource request processing. The portlet can access the validation token provided by the portlet container either through the `RenderRequest` or `ResourceRequest` `ETAG` property, or using the `getETag` method.

The portlet can use the validation token to determine validity of the cached content. If the content is still valid, the portlet should not render any output but instead either set the `RenderResponse` or `ResourceResponse` interface `USE_CACHED_CONTENT` property with a new expiration time, or set a new expiration time using the `CacheControl` interface `setUseCachedContent` method.

Example programmatically setting the cache information:

```
protected void doHeaders (RenderRequest request, RenderResponse response)
    throws PortletException, java.io.IOException
{
    …
   if ( request.getETag() != null ) {  // validation request
    if ( markupIsStillValid(request.getETag()) ) {
           // markup is still valid
           response.getCacheControl().setExpirationTime(30);
           response.getCacheControl().setUseCachedContent(true);
           return;
    }
   }
   // create new content with new validation tag
   response.getCacheControl().setETag(someID);
   response.getCacheControl().setExpirationTime(60);
   PortletRequestDispatcher rd =
getPortletContext().getPortletRequestDispatcher("jsp/view.jsp");
   rd.include(request, response);
}
```

Chapter 24 Security

Portlet applications are created by application developers who license the application to people who deploy the application into a runtime environment. Application developers need to define how the security is to be set up for the deployed application.

24.1 Introduction

A portlet application contains resources that can be accessed by many users. These resources often traverse unprotected, open networks such as the Internet. In such an environment, a substantial number of portlet applications will have security requirements.

The portlet container is responsible for informing portlets of the roles users are in when accessing them. The portlet container does not deal with user authentication. It should leverage the authentication mechanisms provided by the underlying servlet container[16].

24.2 Roles

The Portlet Specification uses the same definition of roles as provided by the servlet specification[17].

24.3 Programmatic Security

Programmatic security is supported through the following `PortletRequest` interface methods:

- `getRemoteUser`
- `isUserInRole`
- `getUserPrincipal`

See Section 15.1.6 Security Attributes.

The `getRemoteUser` method returns the user name the client used for authentication. The `isUserInRole` method determines if a remote user is in a specified security role. The `getUserPrincipal` method determines the principal name of the current user and returns a `java.security.Principal` object. These APIs allow portlets to make business logic decisions based on the information obtained.

The values returned by the `getRemoteUser` and `getUserPrincipal` methods are the same as those returned by the equivalent methods of the servlet response object.

The `isUserInRole` method expects a string parameter with the role-name. A `security-role-ref` element must be declared by the portlet in deployment descriptor with a `role-name` sub-element containing the role-name to be passed to the method. The `security-role-ref` element should contain a `role-link` sub-element whose value is the name of the application security role that the user may be mapped into. This mapping is specified in the `web.xml` deployment descriptor file. The container uses the mapping of `security-role-ref` to `security-role` when determining the return value of the call.

[16] See Servlet Specification 3.1, Chapter 13 Security

[17] See Servlet Specification Version 3.1, Section 13.5 Roles

For example, to map the security role reference `"FOO"` to the security role with role-name `"manager"` the syntax would be:

```
<portlet-app>
    ...
    <portlet>
        ...
        <security-role-ref>
            <role-name>FOO</role-name>
            <role-link>manager</role-link>
        </security-role-ref>
    </portlet>
    ...
    ...
</portlet-app>
```

In this case, if the portlet called by a user belonging to the `"manager"` security role made the API call `isUserInRole("FOO")`, then the result would be true.

If the `security-role-ref` element does not define a `role-link` element, the container must default to checking the `role-name` element argument against the list of `security-role` elements defined in the `web.xml` deployment descriptor of the portlet application. The `isUserInRole` method references the list to determine whether the caller is mapped to a security role. The developer must be aware that the use of this default mechanism may limit the flexibility in changing role-names in the application without having to recompile the portlet making the call.

24.4 Propagation of Security Identity in EJB™ Calls

A security identity, or principal, must always be provided for use in a call to an enterprise bean.

The default mode in calls to EJBs from portlet applications should be for the security identity of a user, in the portlet container, to be propagated to the EJB™ container.

Portlet containers running as part of a Java EE platform are required to allow users that are not known to the portlet container to make calls to the EJB™ container. In these scenarios, the portlet application may specify a `run-as` element in the `web.xml` deployment descriptor. When it is specified, the container must propagate the security identity of the caller to the EJB layer in terms of the security role name defined in the `run-as` element. The security role name must be one of the security role names defined for the `web.xml` deployment descriptor. Alternatively, portlet application code may be the sole processor of the sign on into the EJB™ container.

Chapter 25 Dispatching to JSPs and Servlets

Portlets can delegate the execution of logic or creation of content to servlets and JSPs. This is useful for implementing the Model-View-Controller pattern where the portlet may act as controller and dispatch to different JSPs for rendering the views.

The `PortletRequestDispatcher` interface provides a mechanism to accomplish this dispatching.

Servlets and JSPs invoked from within a portlet in the render phase should generate markup fragments following the recommendations in Appendix B Markup Fragments.

25.1 Obtaining a PortletRequestDispatcher

`PortletRequestDispatcher` objects may be obtained using one of the following methods of the `PortletContext` object:

- `getRequestDispatcher`
- `getNamedDispatcher`

The `getRequestDispatcher` method takes a `String` argument describing a path within the scope of the `PortletContext` of a portlet application. This path must begin with a '/' and it is relative to the `PortletContext` root.

The `getNamedDispatcher` method takes a String argument indicating the name of a servlet known to the `PortletContext` of the portlet application.

If no resource can be resolved based on the given path or name the methods must return `null`.

25.1.1 Query Strings in Request Dispatcher Paths

The `PortletContext` interface `getRequestDispatcher` method creates `PortletRequestDispatcher` objects using path information and optional query string information. For example, a developer may obtain a `PortletRequestDispatcher` by using the following code:

```
String path = "/raisons.jsp?orderno=5";
PortletRequestDispatcher rd. = context.getRequestDispatcher(path);
rd.include(renderRequest, renderResponse);
```

The portlet container must aggregate parameters specified in the query string used to create the `PortletRequestDispatcher` with the portlet parameters. Query string parameters take precedence over other portlet parameters of the same name passed to the servlet or JSP targeted by the forward or include.

The parameters associated with a `PortletRequestDispatcher` are scoped to apply only for the duration of the forward or include call.

25.1.2 Merging Portlet Parameters

The `HttpServletRequest` interface `getParameter`, `getParameterMap`, `getParameterNames`, and `getParameterValues` methods do not discern between portlet

render parameters, action parameters, and resource parameters, so the portlet container must merge the portlet parameters for access through these methods when more than one type of portlet parameter is present. The parameters must be merged in the following order of precedence.

1. Query string parameters specified when obtaining a portlet request dispatcher
2. Portlet action parameters or portlet resource parameters
3. Portlet render parameters

When there is no name clash between the different parameter types, the order of precedence plays no role and all parameters are made available according to the names and values set through the corresponding methods. However, when parameters of different types have the same parameter name, all parameter values must be added to the values array with the values of the parameter with higher precedence appearing before the values of the parameter with lower precedence.

Take for example the parameters in the following table:

Parameter Type	Name	Values
Query string	`color`	`["black", "white"]`
Action parameter	`color`	`["green"]`
Render parameter	`color`	`["white", "yellow"]`

The portlet container must merge these values into a single parameter with parameter name `color` and the values array `["black", "white", "green", "white", "yellow"]` when accessed through the HttpServletRequest parameter methods named above.

25.1.3 Path and Query Information

When the portlet is starting point of the dispatch chain, the `HttpServletRequest` object `getPathInfo`, `getPathTranslated`, `getQueryString`, `getRequestURI` and `getServletPath` methods must return the path and query string information used to obtain the `PortletRequestDispatcher` object.

This differs from servlet processing when no portlet is involved. With forwards and includes originating from a servlet, these values are based on the path and query string of the client request. This makes sense in terms of the servlet programming model, since the included or forward target is treated as if it were running in place of the servlet issuing the request dispatcher include or forward call.

In the portlet programming model, the portlet does not have direct access to the path and query string information from the original client request, so the portlet container must provide the target servlet or JSP with the path and query string information used to obtain the `PortletRequestDispatcher` object.

When doing additional includes or forwards from within a servlet that was target of a portlet request dispatcher call, the semantics outlined in this section must continue to hold. In particular, further dispatch target servlets or JSPs must be provided with the path and query string information used to obtain the `PortletRequestDispatcher` object when using the above named methods.

25.2 Using a Request Dispatcher

To include a servlet or a JSP, a portlet calls the `PortletRequestDispatcher` interface `include` method. To forward the request processing to a servlet or JSP the portlet calls the `forward` method.

The parameters to these methods must be the request and response objects that govern the request being processed, or must be instances of subclasses of the corresponding wrapper classes. In the latter case, the wrapper instances must wrap the original request or response objects created by the container.

The portlet container must ensure that the servlet or JSP called through a `PortletRequestDispatcher` is called in the same thread that invoked the `PortletRequestDispatcher` interface `include` or `forward` method.

25.3 Error Handling

If the servlet or JSP that is target of portlet request dispatching throws a runtime exception, a PortletException, or a checked exception of type `IOException`, the exception must be propagated to the initiating portlet. All other exceptions, including a `ServletException`, must be wrapped with a `PortletException` and rethrown. The root cause of the exception must be set to the original exception before being propagated.

If a portlet throws an exception during action request processing, all operations on the `ActionResponse` must be ignored including set events.

If a portlet throws an exception during event processing, all operations on the `EventResponse` must be ignored including set events. Operations performed during the originating action request processing or during separate, successful event request processing cycles for the current or other portlets must remain unaffected. After the exception has been handled, the portlet container should continue processing other portlets on the portal page.

If a portlet throws an exception during render request processing, the portlet container should clear any data written by the portlet that has not yet been flushed to the portal application[18]. If no data has been flushed to the portal application, the portlet container should clear any headers set by the portlet. Data written by the portal itself or by other portlets as part of the overall portal response must not be affected. The portlet container should continue processing other portlets on the portal page.

If a portlet throws an exception during resource request processing, the portlet container should clear any data written by the portlet that has not yet been flushed to the portal application. If no data has been flushed to the portal application, the portlet container should clear any headers set by the portlet. The portlet container should respond to the client request with an appropriate HTTP status code.

25.4 Portlet-Specific Request Attributes

In addition to the request attributes specified in the Servlet Specification, the portlet request dispatching target servlet or JSP must have the following request attributes set:

Request Attribute Name	Type

[18] See Section 16.5.3 Buffering on page 90 for discussion on response buffer handling.

javax.portlet.config	javax.portlet.PortletConfig
javax.portlet.session	javax.portlet.PortletSession
javax.portlet.preferences	javax.portlet.PortletPreferences

However, if no portlet session exists, the javax.portlet.session attribute must not be set.

For includes during action request processing, the following additional attributes must be set:

Request Attribute Name	Type
javax.portlet.request	javax.portlet.ActionRequest
javax.portlet.response	javax.portlet ActionResponse

For includes during event processing, the following additional attributes must be set:

Request Attribute Name	Type
javax.portlet.request	javax.portlet.EventRequest
javax.portlet.response	javax.portlet.EventResponse

For includes during render request processing, the following additional attributes must be set:

Request Attribute Name	Type
javax.portlet.request	javax.portlet.RenderRequest
javax.portlet.response	javax.portlet.RenderResponse

For includes during resource request processing, the following additional attributes must be set:

Request Attribute Name	Type
javax.portlet.request	javax.portlet.ResourceRequest
javax.portlet.response	javax.portlet.ResourceResponse

These attributes must be the same objects available to the portlet before invoking the PortletRequestDispatcher interface include or forward method. The included servlet or JSP can access the attributes using the HttpServletRequest object getAttribute method.

25.4.1 Changing the Default Behavior for Session Scope

The javax.portlet.session request attribute maps to the portlet session object with application scope by default. Some portlets may require that this attribute maps instead to the portlet session scope in order to work correctly. Such portlets can specify this behavior by setting the portlet container runtime option javax.portlet.servletDefaultSessionScope to the value PORTLET_SCOPE. The default value is APPLICATION_SCOPE. Example:

```
<container-runtime-option>
      <name>javax.portlet.servletDefaultSessionScope</name>
      <value>PORTLET_SCOPE</value>
</container-runtime-option>
```

This is an optional feature not supported by all portlet containers, so portlet developers should note that relying on this feature may restrict the portlet container implementations on which the portlet can be executed.

25.5 *The forward Method*

The `PortletRequestDispatcher` interface `forward` method may be called only when no output has been flushed to the portal application. The portlet request dispatcher `forward` method allows the dispatch target servlet or JSP to set the response content. If output data exists in the response buffer that has not been flushed to the portal application, the content must be cleared before the target servlet `service` method is called. If the response has been flushed to the portal application, an `IllegalStateException` must be thrown.

Information like cookies, properties, portlet mode, window state, render parameters, or the portlet title that the portlet may have set before calling the portlet request dispatcher `forward` method should still be valid.

Before the `RequestDispatcher` interface `forward` method returns, the portlet container must flush any response data to the portlet application and close the output stream for the portlet. . Asynchronous mode is not supported. If an error occurs in the target of a request dispatcher forward, the exception may be propagated back through all of the calling filters and servlets and eventually back to the portlet container.

When using a `RequestDispatcher` in a servlet that was target of a forward from a portlet, the servlet must request the `RequestDispatcher` via the `ServletRequest` and not the `ServletContext`. Using a `RequestDispatcher` that was retrieved from the `ServletContext` may behave in a way that does not comply with this specification.

25.5.1 Forwarded Request Parameters

Except for servlets obtained by using the `getNamedDispatcher` method, a servlet that has been invoked by a portlet using the `forward` method of `RequestDispatcher` has access to the path used to obtain the `PortletRequestDispatcher`.

The following request attributes must be set:

```
javax.servlet.forward.request_uri
javax.servlet.forward.context_path
javax.servlet.forward.servlet_path
javax.servlet.forward.path_info
javax.servlet.forward.query_string
```

The values of these attributes must be equal to the return values of the `HttpServletRequest` methods `getRequestURI`, `getContextPath`, `getServletPath`, `getPathInfo`, `getQueryString` respectively, invoked on the request object passed to the first servlet object in the forward call chain.

These attributes are accessible from the forwarded servlet via the `getAttribute` method on the request object. Note that these attributes must always reflect the information in the target of the first forward servlet even in the situation that multiple forwards and subsequent includes are called.

If the forwarded servlet was obtained by using the `getNamedDispatcher` method, these attributes must not be set.

25.6 The Include Method

The `PortletRequestDispatcher` interface `include` method may be called at any time and multiple times during request processing. The servlet or JSP being included can make use of the received `HttpServletRequest` and `HttpServletResponse` objects subject to restrictions.

The portlet request dispatcher include target cannot set headers or call any method that affects the response headers. It may use the `HttpServletRequest` interface `getSession` or `getSession(boolean)` methods; however, if use of these methods would require adding a `Cookie` response header, the portlet container must throw a `IllegalStateException` if response data has already been flushed to the portal application..

Servlets and JSPs included by portlets should not use the servlet `RequestDispatcher forward` method as its behavior may be non-deterministic.

Servlets and JSPs included from portlets in the `render` method must be handled as HTTP GET requests.

The lookup of the servlet given a path is done according to the servlet path matching rule defined the Servlet Specification[19].

25.6.1 Included Request Parameters

Servlets and JSPs included by portlets must be provided with request attributes as defined by the Servlet Specification[20].

Except for servlets obtained by using the `getNamedDispatcher` method, a servlet or JSP being used from within an `include` call has access to the path used to obtain the `PortletRequestDispatcher`. The following request attributes must be set:

```
javax.servlet.include.request_uri
javax.servlet.include.context_path
javax.servlet.include.servlet_path
javax.servlet.include.path_info
javax.servlet.include.query_string
```

These attributes are accessible from the included servlet using the `HttpServletRequest` object `getAttribute` method and their values must be equal to the request URI, context path, servlet path, path info, and query string of the included servlet, respectively. If the request is subsequently included, these attributes are replaced for that include.

If the included servlet was obtained by using the `getNamedDispatcher` method, these attributes must not be set.

25.7 Servlet filters and Request Dispatching

The Java Servlet Specification allows servlet filters to be specified for servlets that are request dispatching include and forward targets[21]. The portlet container must support this capability

[19] See Servlet Specification Version 3.1, Chapter 12 Mapping Requests to Servlets

[20] See Servlet Specification 3.1, Section 9.3.1 Included Request Parameters

[21] See Servlet Specification 3.1, Chapter 6 Filtering and in particular Section 6.2.5 Filters and the Request Dispatcher

for `PortletRequestDispatcher` dispatching targets. The servlet filters for the servlets included via the `PortletRequestDispatcher` must be defined as described in the Java Servlet Specification.

25.8 HttpServletRequest and HttpServletResponse Objects

When the portlet includes a servlet or JSP, the portlet container must ensure that the capabilities of the servlet request and response methods supplied to the JSP or servlet are restricted in order to maintain the proper portlet request processing semantics.

The tables below defines the required behavior of the `HttpServletRequest` and `HttpServletResponse` methods. For each servlet method in the left column, the subsequent columns define the required output based on the portlet interface named in the column header.

Sometimes the required output can be a constant, such as `'0'`, `null`, or `'HTTP/1.1'`. Where the table cell names a method, the behavior of the servlet method must be the same as the named method applied to the portlet interface named in the column header.

Taking the `HttpServletRequest` interface `getContentLength` method as an example, the method must return the same value as `ActionRequest.getContentLength` during action request processing, but must return 0 during render request processing.

The response of `HttpUtils.getRequestURL` is undefined and should not be used.

25.8.1 Method Behavior during Portlet `include` Dispatching

HttpServletRequest method	ActionRequest mapping	EventRequest mapping	HeaderRquest and RenderRequest mappings	ResourceRequest mapping
getAuthType	getAuthType	getAuthType	getAuthType	getAuthType
getContextPath	getContextPath	getContextPath	getContextPath	getContextPath
getCookies	getCookies	getCookies	getCookies	getCookies
getDateHeader	getProperties	getProperties	getProperties	getProperties
getHeader	getProperties	getProperties	getProperties	getProperties
getHeaderNames	getPropertyNames	getPropertyNames	getPropertyNames	getPropertyNames
getHeaders	getProperties	getProperties	getProperties	getProperties
getIntHeader	getProperties	getProperties	getProperties	getProperties
getMethod	getMethod	getMethod	'GET'	getMethod
getPathInfo	Path and query string[22]	Path and query string[22]	Path and query string[22]	Path and query string[22]
getPathTranslated	Path and query string[22]	Path and query string[22]	Path and query string[22]	Path and query string[22]
getQueryString	Path and query string[22]	Path and query string[22]	Path and query string[22]	Path and query string[22]
getRemoteUser	getRemoteUser	getRemoteUser	getRemoteUser	getRemoteUser
getRequestedSessionId	getRequestedSessionId	getRequestedSessionId	getRequestedSessionId	getRequestedSessionId
getRequestURI	Path and query string[22]	Path and query string[22]	Path and query string[22]	Path and query string[22]
getRequestURL	null	null	null	null
getServletPath	Path and query string[22]	Path and query string[22]	Path and query string[22]	Path and query string[22]
getSession	getPortletSession[23]	getPortletSession[23]	getPortletSession[23]	getPortletSession[23]
getUserPrincipal	getUserPrincipal	getUserPrincipal	getUserPrincipal	getUserPrincipal
isRequestedSessionIdFromCookie	N/A[24]	N/A[24]	N/A[24]	N/A[24]
isRequestedSessionIdFromUrl	N/A[24]	N/A[24]	N/A[24]	N/A[24]
isRequestedSessionIdFromURL	N/A[24]	N/A[24]	N/A[24]	N/A[24]
isRequestedSessionIdValid	isRequestedSessionIdValid	isRequestedSessionIdValid	isRequestedSessionIdValid	isRequestedSessionIdValid
isUserInRole	isUserInRole	isUserInRole	isUserInRole	isUserInRole
getAttribute	getAttribute	getAttribute	getAttribute	getAttribute

[22] Based on the path and query string information used to obtain the `PortletRequestDispatcher`.

[23] The portlet session returned by `getPortletSession(APPLICATION_SCOPE)`

[24] N/A indicates that such a method is not available in the portlet interface and the functionality defined by the Servlet Specification must be provided for this method.

HttpServletRequest method	ActionRequest mapping	EventRequest mapping	HeaderRquest and RenderRequest mappings	ResourceRequest mapping
getAttributeNames	getAttributeNames	getAttributeNames	getAttributeNames	getAttributeNames
getCharacterEncoding	getCharacterEncoding	null	null	getCharacterEncoding
getContentLength	getContentLength	0	0	getContentLength
getContentType	getContentType	null	null	getContentType
getInputStream	getPortletInputStream	null	null	getPortletInputStream
getLocalAddr	null	null	null	null
getLocale	getLocale	getLocale	getLocale	getLocale
getLocales	getLocales	getLocales	getLocales	getLocales
getLocalName	null	null	null	null
getLocalPort	0	0	0	0
getParameter	merged parameters[25]	merged parameters[25]	merged parameters[25]	merged parameters[25]
getParameterMap	merged parameters[25]	merged parameters[25]	merged parameters[25]	merged parameters[25]
getParameterNames	merged parameters[25]	merged parameters[25]	merged parameters[25]	merged parameters[25]
getParameterValues	merged parameters[25]	merged parameters[25]	merged parameters[25]	merged parameters[25]
getProtocol	HTTP/1.1	HTTP/1.1	HTTP/1.1	HTTP/1.1
getReader	getReader	null	null	getReader
getRealPath	null	null	null	null
getRemoteAddr	null	null	null	null
getRemoteHost	null	null	null	null
getRemotePort	0	0	0	0
getRequestDispatcher	N/A[24]	N/A[24]	N/A[24]	N/A[24]
getScheme	getScheme	getScheme	getScheme	getScheme
getServerName	getServerName	getServerName	getServerName	getServerName
getServerPort	getServerPort	getServerPort	getServerPort	getServerPort
isSecure	isSecure	isSecure	isSecure	isSecure
removeAttribute	removeAttribute	removeAttribute	removeAttribute	removeAttribute
setAttribute	setAttribute	setAttribute	setAttribute	setAttribute
setCharacterEncoding	setCharacterEncoding	no-op[26]	no-op[26]	setCharacterEncoding
getContentLengthLong	getContentLengthLong	no-op[26]	no-op[26]	getContentLengthLong
getServletContext	tbd[27]	tbd[27]	tbd[27]	tbd[27]

[25] Accesses merged query string and portlet parameters as described in Section 25.1.2 Merging Portlet Parameters

[26] no-op indicates that this method does not perform any operation.

[27] Still needs to be determined / use case unclear.

HttpServletRequest method	ActionRequest mapping	EventRequest mapping	HeaderRquest and RenderRequest mappings	ResourceRequest mapping
startAsync	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]
startAsync	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]
isAsyncStarted	false	false	false	false
isAsyncSupported	false	false	false	false
getAsyncContext	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]
getDispatcherType	getDispatcherType	getDispatcherType	getDispatcherType	getDispatcherType
changeSessionId	changeSessionId	changeSessionId	changeSessionId	changeSessionId
authenticate	authenticate[29]	authenticate[29]	authenticate[29]	authenticate[29]
login	login[29]	login[29]	login[29]	login[29]
logout	logout[29]	logout[29]	logout[29]	logout[29]
getParts	getParts	no-op[26]	no-op[26]	getParts
getPart	getPart	no-op[26]	no-op[26]	getPart
upgrade	ServletException[30]	ServletException[30]	ServletException[30]	ServletException[30]

HttpServletResponse method	ActionResponse mapping	EventResponse mapping	HeaderResponse and RenderResponse mappings	ResourceResponse mapping
addCookie	no-op[26]	no-op[26]	no-op[26]	no-op[26]
addDateHeader	no-op[26]	no-op[26]	no-op[26]	no-op[26]
addHeader	no-op[26]	no-op[26]	no-op[26]	no-op[26]
addIntHeader	no-op[26]	no-op[26]	no-op[26]	no-op[26]
containsHeader	false	false	false	false
encodeRedirectUrl	null	null	null	null
encodeRedirectURL	null	null	null	null
encodeUrl	encodeURL	encodeURL	encodeURL	encodeURL
encodeURL	encodeURL	encodeURL	encodeURL	encodeURL
sendError	no-op[26]	no-op[26]	no-op[26]	no-op[26]
sendRedirect	no-op[26]	no-op[26]	no-op[26]	no-op[26]
setDateHeader	no-op[26]	no-op[26]	no-op[26]	no-op[26]
setHeader	no-op[26]	no-op[26]	no-op[26]	no-op[26]
setIntHeader	no-op[26]	no-op[26]	no-op[26]	no-op[26]

[28] Async is not supported; method must throw IllegalStateException.
[29] Need to determine how these new security functions fit in with portlet concepts
[30] Revisit – could be used to provide web socket support, for example

HttpServletResponse method	ActionResponse mapping	EventResponse mapping	HeaderResponse and RenderResponse mappings	ResourceResponse mapping
setStatus	no-op[26]	no-op[26]	no-op[26]	no-op[26]
flushBuffer	no-op[26]	no-op[26]	flushBuffer	flushBuffer
getBufferSize	0	0	getBufferSize	getBufferSize
getCharacterEncoding	null	null	getCharacterEncoding	getCharacterEncoding
getContentType	null	null	getContentType	getContentType
getLocale	null	null	getLocale	getLocale
getOutputStream	null stream[31]	null stream[31]	getPortletOutputStream	getPortletOutputStream
getWriter	null writer[31]	null writer[31]	getWriter	getWriter
isCommitted	true	true	isCommitted	isCommitted
reset	no-op[26]	no-op[26]	reset	reset
resetBuffer	no-op[26]	no-op[26]	resetBuffer	resetBuffer
setBufferSize	no-op[26]	no-op[26]	setBufferSize	setBufferSize
setCharacterEncoding	no-op[26]	no-op[26]	no-op[26]	no-op[26]
setContentLength	no-op[26]	no-op[26]	no-op[26]	no-op[26]
setContentType	no-op[26]	no-op[26]	no-op[26]	no-op[26]
setLocale	no-op[26]	no-op[26]	no-op[26]	no-op[26]
setContentLengthLong	no-op[26]	no-op[26]	no-op[26]	setContentLengthLong
getStatus	no-op[26]	no-op[26]	no-op[26]	getStatus
getHeader	getProperty	getProperty	getProperty	getProperty
getHeaders	getProperties	getProperties	getProperties	getProperties
getHeaderNames	getPropertyNames	getPropertyNames	getPropertyNames	getPropertyNames

25.8.2 Method Behavior during Portlet `forward` Dispatching

HttpServletRequest method	ActionRequest mapping	EventRequest mapping	HeaderRequest and RenderRequest mappings	ResourceRequest mapping
getAuthType	getAuthType	getAuthType	getAuthType	getAuthType
getContextPath	getContextPath	getContextPath	getContextPath	getContextPath
getCookies	getCookies	getCookies	getCookies	getCookies
getDateHeader	getProperties	getProperties	getProperties	getProperties
getHeader	getProperties	getProperties	getProperties	getProperties

[31] A ‘null stream’ or ‘null writer’ designates an output stream or writer that ignores all output.

HttpServletRequest method	ActionRequest mapping	EventRequest mapping	HeaderRequest and RenderRequest mappings	ResourceRequest mapping
getHeaderNames	getPropertyNames	getPropertyNames	getPropertyNames	getPropertyNames
getHeaders	getProperties	getProperties	getProperties	getProperties
getIntHeader	getProperties	getProperties	getProperties	getProperties
getMethod	getMethod	ActionRequest.getMethod	'GET'	getMethod
getPathInfo	Path and query string[22]	Path and query string[22]	Path and query string[22]	Path and query string[22]
getPathTranslated	Path and query string[22]	Path and query string[22]	Path and query string[22]	Path and query string[22]
getQueryString	Path and query string[22]	Path and query string[22]	Path and query string[22]	Path and query string[22]
getRemoteUser	getRemoteUser	getRemoteUser	getRemoteUser	getRemoteUser
getRequestedSessionId	getRequestedSessionId	getRequestedSessionId	getRequestedSessionId	getRequestedSessionId
getRequestURI	Path and query string[22]	Path and query string[22]	Path and query string[22]	Path and query string[22]
getRequestURL	null	null	null	null
getServletPath	Path and query string[22]	Path and query string[22]	Path and query string[22]	Path and query string[22]
getSession	getPortletSession[23]	getPortletSession[23]	getPortletSession[23]	getPortletSession[23]
getUserPrincipal	getUserPrincipal	getUserPrincipal	getUserPrincipal	getUserPrincipal
isRequestedSessionIdFromCookie	N/A[24]	N/A[24]	N/A[24]	N/A[24]
isRequestedSessionIdFromUrl	N/A[24]	N/A[24]	N/A[24]	N/A[24]
isRequestedSessionIdFromURL	N/A[24]	N/A[24]	N/A[24]	N/A[24]
isRequestedSessionIdValid	isRequestedSessionIdValid	isRequestedSessionIdValid	isRequestedSessionIdValid	isRequestedSessionIdValid
isUserInRole	isUserInRole	isUserInRole	isUserInRole	isUserInRole
getAttribute	getAttribute	getAttribute	getAttribute	getAttribute
getAttributeNames	getAttributeNames	getAttributeNames	getAttributeNames	getAttributeNames
getCharacterEncoding	getCharacterEncoding	null	null	getCharacterEncoding
getContentLength	getContentLength	0	0	getContentLength
getContentType	getContentType	null	null	getContentType
getInputStream	getPortletInputStream	null	null	getPortletInputStream
getLocalAddr	null	null	null	null
getLocale	getLocale	getLocale	getLocale	getLocale
getLocales	getLocales	getLocales	getLocales	getLocales
getLocalName	null	null	null	null
getLocalPort	0	0	0	0
getParameter	merged parameters[25]	merged parameters[25]	merged parameters[25]	merged parameters[25]
getParameterMap	merged parameters[25]	merged parameters[25]	merged parameters[25]	merged parameters[25]
getParameterNames	merged parameters[25]	merged parameters[25]	merged parameters[25]	merged parameters[25]
getParameterValues	merged parameters[25]	merged parameters[25]	merged parameters[25]	merged parameters[25]

HttpServletRequest method	ActionRequest mapping	EventRequest mapping	HeaderRequest and RenderRequest mappings	ResourceRequest mapping
getProtocol	HTTP/1.1	HTTP/1.1	HTTP/1.1	HTTP/1.1
getReader	getReader	null	null	getReader
getRealPath	null	null	null	null
getRemoteAddr	null	null	null	null
getRemoteHost	null	null	null	null
getRemotePort	0	0	0	0
getRequestDispatcher	N/A[24]	N/A[24]	N/A[24]	N/A[24]
getScheme	getScheme	getScheme	getScheme	getScheme
getServerName	getServerName	getServerName	getServerName	getServerName
getServerPort	getServerPort	getServerPort	getServerPort	getServerPort
isSecure	isSecure	isSecure	isSecure	isSecure
removeAttribute	removeAttribute	removeAttribute	removeAttribute	removeAttribute
setAttribute	setAttribute	setAttribute	setAttribute	setAttribute
setCharacterEncoding	setCharacterEncoding	no-op[26]	no-op[26]	setCharacterEncoding
getContentLengthLong	getContentLengthLong	no-op[26]	no-op[26]	getContentLengthLong
getServletContext	tbd[27]	tbd[27]	tbd[27]	tbd[27]
startAsync	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]
startAsync	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]
isAsyncStarted	false	false	false	false
isAsyncSupported	false	false	false	false
getAsyncContext	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]	IllegalStateException[28]
getDispatcherType	getDispatcherType	getDispatcherType	getDispatcherType	getDispatcherType
changeSessionId	changeSessionId	changeSessionId	changeSessionId	changeSessionId
authenticate	authenticate[29]	authenticate[29]	authenticate[29]	authenticate[29]
login	login[29]	login[29]	login[29]	login[29]
logout	logout[29]	logout[29]	logout[29]	logout[29]
getParts	getParts	no-op[26]	no-op[26]	getParts
getPart	getPart	no-op[26]	no-op[26]	getPart
upgrade	ServletException[30]	ServletException[30]	ServletException[30]	ServletException[30]

HttpServletResponse method	ActionResponse mapping	EventResponse mapping	HeaderResponse and RenderResponse mappings	ResourceResponse mapping
addCookie	addProperty	addProperty	addProperty	addProperty
addDateHeader	no-op[26]	no-op[26]	addProperty	addProperty

HttpServletResponse method	ActionResponse mapping	EventResponse mapping	HeaderResponse and RenderResponse mappings	ResourceResponse mapping
addHeader	no-op[26]	no-op[26]	addProperty	addProperty
addIntHeader	no-op[26]	no-op[26]	addProperty	addProperty
containsHeader	false	false	false	false
encodeRedirectUrl	null	null	null	null
encodeRedirectURL	null	null	null	null
encodeUrl	encodeURL	encodeURL	encodeURL	encodeURL
encodeURL	encodeURL	encodeURL	encodeURL	encodeURL
sendError	no-op[26]	no-op[26]	no-op[26]	no-op[26]
sendRedirect	no-op[26]	no-op[26]	no-op[26]	no-op[26]
setDateHeader	no-op[26]	no-op[26]	setProperty	setProperty
setHeader	no-op[26]	no-op[26]	setProperty	setProperty
setIntHeader	no-op[26]	no-op[26]	setProperty	setProperty
setStatus	no-op[26]	no-op[26]	no-op[26]	setStatus
flushBuffer	no-op[26]	no-op[26]	flushBuffer	flushBuffer
getBufferSize	0	0	getBufferSize	getBufferSize
getCharacterEncoding	null	null	getCharacterEncoding	getCharacterEncoding
getContentType	null	null	getContentType	getContentType
getLocale	null	null	getLocale	getLocale
getOutputStream	null stream[31]	null stream[31]	getPortletOutputStream	getPortletOutputStream
getWriter	null writer[31]	null writer[31]	getWriter	getWriter
isCommitted	false	false	isCommitted	isCommitted
reset	no-op[26]	no-op[26]	reset	reset
resetBuffer	no-op[26]	no-op[26]	resetBuffer	resetBuffer
setBufferSize	no-op[26]	no-op[26]	setBufferSize	setBufferSize
setCharacterEncoding	no-op[26]	no-op[26]	no-op[26]	setCharacterEncoding
setContentLength	no-op[26]	no-op[26]	no-op[26]	setContentLength
setContentType	no-op[26]	no-op[26]	setContentType	setContentType
setLocale	no-op[26]	no-op[26]	no-op[26]	setLocale
setContentLengthLong	no-op[26]	no-op[26]	no-op[26]	setContentLengthLong
getStatus	no-op[26]	no-op[26]	no-op[26]	getStatus
getHeader	getProperty	getProperty	getProperty	getProperty
getHeaders	getProperties	getProperties	getProperties	getProperties
getHeaderNames	getPropertyNames	getPropertyNames	getPropertyNames	getPropertyNames

Chapter 26 Portlet Tag Library

The portlet tag library allows JavaServer Pages that are portlet request dispatcher targets to access portlet-specific artifacts such as the `RenderRequest`, `ResourceRequest`, `ActionResponse`, or `RenderResponse`. It also provides custom JSP tags that access portlet functionality such as portlet URL creation.

The portlet-container must provide an implementation of the portlet tag library. Portlet developers may indicate an alternate implementation using the mechanism defined in the JSP Specification[32].

JSP pages that use the portlet tag library must declare its use through a taglib directive with the `uri` attribute set to `"http://xmlns.jcp.org/portlet_3_0"`. The example below shows a taglib directive using the suggested prefix value `"portlet"`.

```
<%@ taglib uri="http://xmlns.jcp.org/portlet_3_0" prefix="portlet" %>
```

The portlet container must support JavaServer Pages Version 2.2 and Expression Language Version 3.0 for the tags in the portlet tag library.

The portlet container must support taglib directives for older versions of the portlet tag library. The table below shows corresponding example taglib directives for the Portlet Specification Version 1.0 and 2.0.

Version 2.0	`<%@ taglib uri="http://java.sun.com/portlet_2_0" prefix="portlet" %>`
Version 1.0	`<%@ taglib uri="http://java.sun.com/portlet" prefix="portlet" %>`

In order to support migration, JSPs included by newer portlet versions may reference older tag library versions. For example, a version 3.0 portlet may include a JSP that contains a version 2.0 taglib directive.

26.1 `defineObjects` Tag

The `defineObjects` tag must define the following variables in the JSP page:

- `PortletRequest portletRequest` must always be defined
- `PortletResponse portletResponse` must always be defined
- `RenderRequest renderRequest` when included during render request processing, `null` or not defined otherwise
- `ResourceRequest resourceRequest` when included during resource request processing, `null` or not defined otherwise
- `ActionRequest actionRequest` when included during action request processing, `null` or not defined otherwise

[32] See JSP Specification Version 2.2, Section *JSP.7.3.9 Well-Known URIs*.

- `EventRequest eventRequest` when included during event request processing, `null` or not defined otherwise
- `RenderResponse renderResponse` when included during render request processing, `null` or not defined otherwise
- `ResourceResponse resourceResponse` when included during resource request processing, `null` or not defined otherwise
- `ActionResponse actionResponse` when included during action request processing, `null` or not defined otherwise
- `EventResponse eventResponse` when included during event request processing, `null` or not defined otherwise
- `PortletConfig portletConfig`
- `PortletSession portletSession`, providing access to the portletSession, does not create a new session, only returns an existing session or `null` if no session exists.
- `Map<String, Object> portletSessionScope`, providing access to the portletSession attributes as a Map equivalent to the `PortletSession.getAttributeMap()` call, does not create a new session, and only returns an existing session. If no session attributes exist this method returns an empty Map.
- `PortletPreferences portletPreferences`, providing access to the portlet preferences.
- `Map<String, String[]> portletPreferencesValues`, providing access to the portlet preferences as a Map, equivalent to the `PortletPreferences.getMap()` call. If no portlet preferences exist this method returns an empty Map.

These variables must reference the same portlet artifacts stored as request attributes as defined in Section 25.4 Portlet-Specific Request Attributes.

A JSP using the `defineObjects` tag may use these variables in scriptlets throughout the page.

The `defineObjects` tag must not define any attribute and it must not contain any body content.

An example of a JSP using the `defineObjects` tag could be:

```
<portlet:defineObjects/>

<%=renderResponse.getCacheControl().setExpirationTime(10)%>
```

After using the `defineObjects` tag, the JSP invokes the `renderResponse` object `getCacheControl()` method to set the expiration time of the response to 10 seconds.

26.2 `actionURL` Tag

The portlet `actionURL` tag creates a URL that must point to the current portlet and must trigger an action request with the supplied parameters.

Parameters may be added to the URL by including the `param` tag between the `actionURL` start and end tags.

The following attributes are defined for this tag:

- **windowState** (Type: `String`, optional) – indicates the window state that the portlet should have when this link is executed. The following window states are predefined: `minimized`, `normal`, and `maximized`. If the specified window state is illegal for the

current request, a `JspException` must be thrown. Reasons for a window state being illegal may include that the portal does not support this state, the portlet has not declared in its deployment descriptor that it supports this state, or the current user is not allowed to switch to this state. If a window state is not set for a URL, it should stay the same as the window state of the current request. The window state attribute is not case sensitive.

- **portletMode** (Type: `String`, optional) – indicates the portlet mode that the portlet must have when this link is executed, if no error condition ocurred. The following portlet modes are predefined: `edit`, `help`, and `view`. If the specified portlet mode is illegal for the current request, a `JspException` must be thrown. Reasons for a portlet mode being illegal may include that the portal does not support this mode, the portlet has not declared in its deployment descriptor that it supports this mode for the current markup, or the current user is not allowed to switch to this mode. If a portlet mode is not set for a URL, it must stay the same as the mode of the current request. The portlet mode attribute is not case sensitive.
- **var** (Type: `String`, optional) – name of the exported scoped variable for the action URL. The exported scoped variable must be a `String`. By default, the result of the URL processing is written to the current `JspWriter`. If the result is exported as a JSP scoped variable, defined via the `var` attributes, nothing is written to the current `JspWriter`.

  Note: After the URL is created it is not possible to extend the URL or add any further parameter using the variable and String concatenation. If the given variable name already exists in the scope of the page or it is used within an iteration loop, the new value overwrites the old one.
- **secure** (Type: `String`, optional) – indicates if the resulting URL should be a secure connection (`secure="true"`) or an insecure one (`secure="false"`). If the specified security setting is not supported by the run-time environment, a `JspException` must be thrown. If the security is not set for a URL, it must stay the same as the security setting of the current request.
- **copyCurrentRenderParameters** (Type: `boolean`, optional) – if set to true requests that the private render parameters of the portlet of the current request must be attached to this URL. It is equivalent to setting each of the current private render parameters via the `<portlet:param>` tag. If additional `<portlet:param>` tags are specified parameters with the same name as an existing render parameter will get merged and the value defined in additional `<portlet:param>` tags must be pre-pended. The default for this attribute is `false`.
- **escapeXml** (Type: `boolean`, optional) – determines whether characters `<,>,&,',"` in the resulting output should be converted to their corresponding character entity codes (‘`<`’ gets converted to ‘`<`’, ‘`>`’ gets converted to ‘`>`’ ‘`&`’ gets converted to ‘`&`’, ‘`'`’ gets converted to ‘`&#039;`’, ‘`"`’ gets converted to ‘`&#034;`’). Default value is `true`.
- **name** (Type: `String`, optional) – specifies the value for the action name parameter that can be used during request dispatching. See Section 4.7.1 Dispatching to `GenericPortlet` Annotated Methods. Setting this name will result in adding a parameter to this action URL with the name `javax.portlet.action`.

A `JspException` with the `PortletException` that caused this error as root cause is thrown in the following cases:

- If an illegal window state is specified in the `windowState` attribute.
- If an illegal portlet mode is specified in the `portletMode` attribute.

- If an illegal security setting is specified in the `secure` attribute.

A `JspException` with the `java.lang.IllegalStateException` that caused this error as root cause is thrown in the following cases:

- If this tag is used in markup generated during resource request processing that was directly or indirectly triggered via a resource URL of type `FULL` or `PORTLET`.

An example of a JSP using the `actionURL` tag could be:

```
<portlet:actionURL copyCurrentRenderParameters="true" windowState="maximized"
portletMode="edit" name="editStocks">
   <portlet:param name="page" value="1"/>
</portlet:actionURL>
```

The example creates a URL that brings the portlet into `EDIT` mode and `MAXIMIZED` window state to edit the stocks quote list.

26.3 `renderURL` Tag

The portlet `renderURL` tag creates a URL that must point to the current portlet and must trigger a render request with the supplied parameters.

Parameters may be added by including the `param` tag between the `renderURL` start and end tags.

The following attributes are defined for this tag:

- **windowState** (Type: `String`, optional) – indicates the window state that the portlet should have when this link is executed. The following window states are predefined: `minimized`, `normal`, and `maximized`. If the specified window state is illegal for the current request, a `JspException` must be thrown. Reasons for a window state being illegal may include that the portal does not support this state, the portlet has not declared in its deployment descriptor that it supports this state, or the current user is not allowed to switch to this state. If a window state is not set for a URL, it should stay the same as the window state of the current request. The window state attribute is not case sensitive.
- **portletMode** (Type: `String`, optional) – indicates the portlet mode that the portlet must have when this link is executed, if not error condition ocurred. The following portlet modes are predefined: `edit`, `help`, and `view`. If the specified portlet mode is illegal for the current request, a `JspException` must be thrown. Reasons for a portlet mode being illegal may include that the portal does not support this mode, the portlet has not declared in its deployment descriptor that it supports this mode for the current markup, or the current user is not allowed to switch to this mode. If a portlet mode is not set for a URL, it must stay the same as the mode of the current request. The portlet mode attribute is not case sensitive.
- **var** (Type: `String`, optional) – name of the exported scoped variable for the render URL. The exported scoped variable must be a `String`. By default, the result of the URL processing is written to the current `JspWriter`. If the result is exported as a JSP scoped variable, defined via the `var` attributes, nothing is written to the current `JspWriter`.

  Note: After the URL is created it is not possible to extend the URL or add any further parameter using the variable and String concatenation. If the given variable name already exists in the scope of the page or it is used within an iteration loop, the new value overwrites the old one.

- **secure** (Type: `String`, optional) – indicates if the resulting URL should be a secure connection (`secure="true"`) or an insecure one (`secure="false"`). If the specified security setting is not supported by the run-time environment, a JspException must be thrown. If the security is not set for a URL, it must stay the same as the security setting of the current request.
- **copyCurrentRenderParameters** (Type: `boolean`, optional) – if set to `true` requests that the private render parameters of the portlet of the current request must attached to this URL. It is equivalent to setting each of the current private render parameters via the `<portlet:param>` tag. If additional `<portlet:param>` tags are specified parameters with the same name as an existing render parameter will get merged and the value defined in additional `<portlet:param>` tags must be pre-pended. The default for this attribute is `false`.
- **escapeXml** (Type: boolean, optional) – determines whether characters `<,>,&,',"` in the resulting output should be converted to their corresponding character entity codes (‘<’ gets converted to ‘`<`’, ‘>’ gets converted to ‘`>`’ ‘&’ gets converted to ‘`&`’, ‘'’ gets converted to ‘`&#039;`’, ‘"’ gets converted to ‘`&#034;`’). Default value is `true`.

A `JspException` with the `PortletException` that caused this error as root cause is thrown in the following cases:

- If an illegal window state is specified in the `windowState` attribute.
- If an illegal portlet mode is specified in the `portletMode` attribute.
- If an illegal security setting is specified in the `secure` attribute.

A `JspException` with the `java.lang.IllegalStateException` that caused this error as root cause is thrown in the following cases:

- If this tag is used in markup generated during resource request processing that was directly or indirectly triggered via a resource URL of type `FULL` or `PORTLET`.

An example of a JSP using the `renderURL` tag could be:

```
<portlet:renderURL portletMode="view" windowState="normal">
   <portlet:param name="showQuote" value="myCompany"/>
   <portlet:param name="showQuote" value="someOtherCompany"/>
</portlet:renderURL>
```

The example creates a URL to provide a link that shows the stock quote of myCompany and someOtherCompany and changes the portlet mode to `VIEW` and the window state to `NORMAL`.

26.4 `resourceURL` Tag

The portlet `resourceURL` tag creates a URL that must point to the current portlet and must trigger a resource request with the supplied parameters.

The `resourceURL` must preserve the current portlet mode, window state and render parameters.

Parameters may be added by including the `param` tag between the `resourceURL` start and end tags. If such a parameter has the same name as a render parameter in this URL, the render parameter value must be the last value in the attribute value array.

The following attributes are defined for this tag:

- **var** (Type: `String`, optional) – name of the exported scoped variable for the resource URL. The exported scoped variable must be a `String`. By default, the result of the URL

processing is written to the current `JspWriter`. If the result is exported as a JSP scoped variable, defined via the `var` attributes, nothing is written to the current `JspWriter`.

Note: After the URL is created it is not possible to extend the URL or add any further parameter using the variable and String concatenation. If the given variable name already exists in the scope of the page or it is used within an iteration loop, the new value overwrites the old one.

- **secure** (Type: `String`, optional) – indicates if the resulting URL should be a secure connection (`secure="true"`) or an insecure one (`secure="false"`). If the specified security setting is not supported by the run-time environment, a `JspException` must be thrown. If the security is not set for a URL, it must stay the same as the security setting of the current request.
- **escapeXml** (Type: `boolean`, optional) – determines whether characters `<,>,&,',"` in the resulting output should be converted to their corresponding character entity codes (‘<’ gets converted to ‘`<`’, ‘>’ gets converted to ‘`>`’ ‘&’ gets converted to ‘`&`’, ‘'’ gets converted to ‘`&#039;`’, ‘"’ gets converted to ‘`&#034;`’). Default value is `true`
- **id** (type:`String`, optional) – sets the ID for this resource. The ID can be retrieved the ResourceRequest object via the `getResourceID` method.
- **cacheability** (type: `String`, optional) – defines the cacheability of the markup returned by this resource URL. Valid values are: "`FULL`", "`PORTLET`", and "`PAGE`". See Section 14.2 The Resource URL for more details on these constants. If `cacheability` is not set, the default is `PAGE`.

A `JspException` with the `PortletException` that caused this error as root cause is thrown in the following case:

- If an illegal security setting is specified in the `secure` attribute.

A `JspException` with the `java.lang.IllegalStateException` that caused this error as root cause is thrown in the following cases:

- If this tag is used in markup generated during resource request processing that was directly or indirectly triggered via a resource URL of a weaker cacheability type.

An example of a JSP using the `resourceURL` tag could be:

```
<portlet:resourceURL id="icons/mypict.gif" var="iconsURL"/>
<img src="<%=iconsURL%>" >
```

The example creates a URL to provide a link that renders the icon named `mypict.gif` via the default `GenericPortlet` resource serving mechanism.

26.5 `namespace` Tag

This tag produces a unique value for the current portlet and must match the value of `PortletResponse.getNamespace` method.

This tag should be used for named elements in the portlet output (such as JavaScript functions and variables). The namespacing ensures that the given name is uniquely associated with this portlet and avoids name conflicts with other elements on the portal page or with other portlets on the page.

The `namespace` tag must not allow any body content.

An example of a JSP using the `namespace` tag could be:

```
<A HREF="javascript:<portlet:namespace/>doFoo()">Foo</A>
```

The example prefixes a JavaScript function with the name 'doFoo', ensuring uniqueness on the portal page.

26.6 param Tag

This tag defines a parameter that may be added to an actionURL, renderURL or resourceURL.

The param tag must not contain any body content.

If the param tag has an empty value the specified parameter name must be removed from the URL. In the case of a resource URL, an empty value does not alter the render parameters automatically added by the portlet container to resource URLs.

This tag adds render parameters to a render URL, resource parameters to a resource URL, and either action parameters or render parameters to an action URL depending on the type attribute.

If the same name of a parameter occurs more than once within an actionURL, renderURL or resourceURL the values must be delivered as parameter value array with the values in the order of the declaration within the URL tag.

The following attributes are defined for this tag:

- **name** (Type: String, required) – the name of the parameter to add to the URL. If name is null or empty, no action is performed.
- **value** (Type: String, required) – the value of the parameter to add to the URL. If value is null, it is processed as an empty value.
- **type** (Type: String, optional) – the type of the parameter to add to the URL. If specified, this attribute is ignored if the param tag is used with a render URL or resource URL.

  If the param tag is used with an action URL, the attribute value may be either "action" or "render". The attribute value is case-insensitive. If the type is set to "render", a render parameter is added, and if the type is set to "action", an action parameter is added.

  If the param tag is used with an action URL but the type attribute is not specified, type="action" is assumed.

An example of a JSP using the param tag could be:

```
<portlet:param name="myParam" value="someValue"/>
```

26.7 property Tag

This tag defines a property that may be added to an actionURL, renderURL or resourceURL and is equivalent to the API call addProperty().

The property tag should not contain any body content.

If the same name of a property occurs more than once within an actionURL, renderURL or resourceURL, the values should be delivered as properties value array with the values in the order of the declaration within the URL tag.

The following *required attributes* are defined for this tag:

- **name** (Type: `String`, required) – the name of the property to add to the URL. If `name` is `null` or empty, no action is performed.
- **value** (Type: `String`, required) – the value of the property to add to the URL. If `value` is `null`, it is processed as an empty value.

An example of a JSP using the `param` tag could be:

```
<portlet:actionURL>
    <portlet:property name="myProperty" value="someValue"/>
</portlet:actionURL>
```

26.8 Changing the Default Behavior for escapeXml

The portlet container performs XML escaping on URLs by default. The default behavior can be changed using a portlet container runtime option. See Section 9.4.1 Runtime Option javax.portlet.escapeXml for more information.

Chapter 27 Packaging and Deployment

The deployment descriptor conveys the elements and configuration information of a portlet application between people who develop, assemble, and deploy portlet applications. Portlet applications are self-contained applications that are intended to work without further resources. Portlet applications are managed by the portlet container.

A portlet application is a web application, so the portlet application is required to have a web application deployment descriptor (web.xml) as defined by the Servlet Specification[33].

The version 3.0 portlet container is required provide backward compatibility for version 1.0 and version 2.0 portlets, so it is also required to support the corresponding versions of the portlet and web application deployment descriptors as well.

All web resources that are not portlets must be declared through annotations or through the `web.xml` deployment descriptor as described in the Servlet Specification. The following portlet web application properties can be set in the `web.xml` deployment descriptor:

- portlet application description using the `<description>` element
- portlet application name using the `<display-name>` element
- portlet application security role mapping using the `<security-role>` element
- portlet application locale-character set mapping for serving resources using the `<locale-encoding-mapping-list>`.

Portlet configuration can be carried out through use of annotations or through the portlet deployment descriptor (portlet.xml) as described in Chapter 28 Configuration. If the portlet can be completely configured using annotations, the portlet deployment descriptor is optional.

The mechanism by which portlets are actually deployed on the portal is implementation specific and not subject of this document.

27.1 Packaging

All resources, portlets, and the deployment descriptors are packaged together in one web application archive (WAR file). This format is described by the Servlet Specification[33]. A portlet application requires the following resources in addition to those defined by the Servlet Specification:

- The `/WEB-INF/portlet.xml` deployment descriptor if the configuration is not completely defined through annotations.
- Portlet classes in the `/WEB-INF/classes` directory.
- Portlet Java Archive files `/WEB-INF/lib/*.jar`

27.1.1 Example Directory Structure

The following lists all files in a sample portlet application:

[33] See Servlet Specification Version 3.1 Chapter 10 Web Applications and Chapter 13 Deployment Descriptor.

```
/images/myButton.gif
/META-INF/MANIFEST.MF
/WEB-INF/web.xml
/WEB-INF/portlet.xml
/WEB-INF/lib/myHelpers.jar
/WEB-INF/classes/com/mycorp/servlets/MyServlet.class
/WEB-INF/classes/com/mycorp/portlets/MyPortlet.class
/WEB-INF/jsp/myHelp.jsp
```

Portlet applications that need additional resources that cannot be packaged in the WAR file, like EJBs, may be packaged together with these resources in an EAR file.

27.1.2 Version Information

Portlet application providers can provide version information about the portlet application through `META-INF/MANIFEST.MF` entries in the WAR file. The `'Implementation-*'` attributes should be used to define the version information. The version information should follow the format defined by the Java Product Versioning Specification[34]. An example follows.

```
Implementation-Title: myPortletApplication
Implementation-Version: 1.1.2
Implementation-Vendor: SunMicrosystems. Inc.
```

27.2 Portlet Deployment Descriptor Structure

This section describes the overall structure of the portlet deployment descriptor. The individual data elements contained therein are described in Chapter 28 Configuration.

Appendix E Deployment Descriptor Schema shows the complete Portlet Specification 3.0 deployment descriptor schema.

27.2.1 Portlet Deployment Descriptor Elements

The following types of configuration and deployment information are required to be supported in the portlet deployment descriptor for all portlet containers:

- Portlet Application Definition
- Portlet Definition

Security information, which may also appear in the deployment descriptor is not required to be supported unless the portlet container is part of an implementation of the Java EE Specification.

27.2.2 Rules for processing the Portlet Deployment Descriptor

In this section is a listing of some general rules that the portlet container must observe concerning the processing of the deployment descriptor for a portlet application:

- Portlet containers should ignore all leading whitespace characters before the first non-whitespace character, and all trailing whitespace characters after the last non-whitespace character for PCDATA within text nodes of a deployment descriptor.

[34] See the Jar File Specification, http://docs.oracle.com/javase/7/docs/technotes/guides/jar/jar.html. Note that the Servlet Specification states "The format of the manifest entry should follow the standard JAR manifest format." See the Java Product Versioning Specification, https://docs.oracle.com/javase/7/docs/technotes/guides/versioning/spec/versioning2.html.

- Portlet containers and tools that manipulate portlet applications have a wide range of options for checking the validity of a WAR. This includes checking the validity of the web application and portlet deployment descriptor documents held within. It is recommended, but not required, that portlet containers and tools validate both deployment descriptors against the corresponding DTD and XML Schema definitions for structural correctness. Additionally, it is recommended that they provide a level of semantic checking. For example, it should be checked that a role referenced in a security constraint has the same name as one of the security roles defined in the deployment descriptor. In cases of non-conformant portlet applications, tools and containers should inform the developer with descriptive error messages. High end application server vendors are encouraged to supply this kind of validity checking in the form of a tool separate from the container.
- In elements whose value is an "enumerated type", the value is case sensitive.

27.2.3 Uniqueness of Deployment Descriptor Values

The following deployment descriptor values must be unique in the scope of the portlet application definition:

- portlet `<portlet-name>`
- custom-portlet-mode `<portlet-mode>`
- custom-window-state `<window-state>`
- user-attribute `<name>`
- event-definition `<name>` and `<qname>`
- public-render-parameter `<name>` and `<qname>`
- filter `<filter-name>`

The following deployment descriptor values must be unique in the scope of the portlet definition:

- init-param `<name>`
- supports `<mime-type>`
- preference `<name>`
- security-role-ref `<role-name>`
- `<supported-processing-event>`
- `<supported-publishing-event>`
- `<supported-public-render-parameter>`

27.2.4 Localization of Deployment Descriptor Values

Localization of deployment descriptor values allows the deployment tool to provide localized deployment messages to the person deploying the portlet application. The following deployment descriptor elements may exist multiple times with different locale information in the `xml:lang` attribute:

- all `<description>` elements
- portlet `<display-name>`

The default value for the `xml:lang` attribute is English (`"en"`). Portlet-container implementations using localized values of these elements should treat the English (`"en"`) values as the default fallback value for all other locales.

The preferred method for localization of values in the deployment descriptor is providing a resource bundle via the `<resource-bundle>` element on the portlet application level (see Resource Bundle section below).

27.3 Deployment Descriptor Example

```
<?xml version="1.0" encoding="UTF-8"?>
<portlet-app xmlns="http://xmlns.jcp.org/xml/ns/portlet" version="3.0"
             xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/portlet
                   http://xmlns.jcp.org/xml/ns/portlet/portlet-app_3_0.xsd">
  <portlet>
    <description xml:lang="en">Portlet displaying the time in different time zones</description>
    <description xml:lang="de">Dieses Portlet zeigt die Zeit in verschiedenen Zeitzonen an.
</description>
    <portlet-name>TimeZoneClock</portlet-name>
    <display-name xml:lang="en">Time Zone Clock Portlet</display-name>
    <display-name xml:lang="de">ZeitzonenPortlet</display-name>
    <portlet-class>com.myco.samplets.util.zoneclock.ZoneClock</portlet-class>
    <expiration-cache>60</expiration-cache>
    <supports>
      <mime-type>text/html</mime-type>
      <portlet-mode>config</portlet-mode>
      <portlet-mode>edit</portlet-mode>
      <portlet-mode>help</portlet-mode>
    </supports>
    <supported-locale>en</supported-locale>
    <portlet-info>
      <title>Time Zone Clock</title>
      <short-title>TimeZone</short-title>
      <keywords>Time, Zone, World, Clock</keywords>
    </portlet-info>
    <portlet-preferences>
      <preference>
        <name>time-server</name>
        <value>http://timeserver.myco.com</value>
        <read-only>true</read-only>
      </preference>
    </portlet-preferences>
    <security-role-ref>
      <role-name>trustedUser</role-name>
      <role-link>auth-user</role-link>
    </security-role-ref>
  </portlet>
  <custom-portlet-mode>
    <description xml:lang="en">Pre-defined custom portlet mode CONFIG</description>
    <portlet-mode>CONFIG</portlet-mode>
  </custom-portlet-mode>
  <custom-window-state>
    <description xml:lang="en">Occupies 50% of the portal page</description>
    <window-state>half-page</window-state>
  </custom-window-state>
  <user-attribute>
    <description xml:lang="en">Pre-defined attribute for the telephone number of the user at
work.</description>
    <name>workInfo/telephone</name>
  </user-attribute>
  <security-constraint>
    <portlet-collection>
      <portlet-name>TimeZoneClock</portlet-name>
    </portlet-collection>
    <user-data-constraint>
      <transport-guarantee>CONFIDENTIAL</transport-guarantee>
    </user-data-constraint>
  </security-constraint>
</portlet-app>
```

Chapter 28 Configuration

The configuration data can be provided through annotations or through the portlet deployment descriptor. When values are provided through both the deployment descriptor and through annotations, the values from the deployment descriptor take precedence.

This chapter presents all configuration data and provides both annotation and deployment descriptor usage examples.

The configuration contains information described at the portlet application level that applies to all portlets for all portlets in the portlet application and information described at the portlet level that applies only to the specific portlet. The following section refer to these two types of configuration data as the *portlet application configuration* and *portlet configuration*, respectively.

The portlet deployment descriptor allows specification of portlet application configuration within the `<portlet-app>` element. The `@PortletApplication` annotation contains many of the portlet application configuration elements provided by the `<portlet-app>` element. However, some of the portlet application configuration elements, such as those defining portlet filters and portlet URL generation listeners, are mapped to other configuration annotations as will be discussed below.

The `<portlet-app>` element also contains `<portlet>` child elements for each portlet in the portlet application.

The `<portlet>` element within the portlet deployment descriptor contains the portlet-specific configuration data. The `@PortletConfiguration` annotation contains many of the portlet configuration elements provided by the `<portlet>` element. However, some of the portlet configuration elements, such as those defining portlet events, are mapped to other configuration annotations as will be discussed below.

28.1 Portlet Application Configuration

This section describes the portlet application configuration.

Since the `<portlet-app>` element encloses the portlet definitions within the portlet deployment descriptor, it must always be present. However, the configuration items contained within the `<portlet-app>` element are optional and need only appear when needed.

The `@PortletApplication` is a type annotation that can be applied to any valid managed bean in the portlet application. It may appear at most once within the portlet application.

If the portlet provides a portlet deployment descriptor `<portlet-app>` element in addition to the `@PortletApplication` annotation, the portlet container must merge the portlet application configuration values with the configuration values provided through the `@PortletApplication` annotation. In cases where the same type of configuration data (such as a portlet container runtime option with a specific key) is provided in both the `@PortletApplication` annotation and the portlet deployment descriptor `<portlet-app>` element, the value from the portlet deployment descriptor must take precedence.

The `@PortletApplication` does not contain the individual `@PortletConfiguration` elements, so it is optional, and need only be used when the configuration items contained therein are needed.

28.1.1 Portlet API Version

The version field declares the portlet API used by the portlet application. It is specified as an element attribute in the portlet deployment descriptor `<portlet-app>` element, and in the `@PortletApplication` annotation version element. The value must be "3.0" to obtain the functionality described in this specification.

Portlet deployment descriptor example:

```
<portlet-app xmlns="http://xmlns.jcp.org/xml/ns/portlet"
             xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
             xmlns:rp=
      "http://www.apache.org/portals/pluto/pub-render-params/ResourcePortlet"
             xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/portlet
http://xmlns.jcp.org/xml/ns/portlet/portlet-app_3_0.xsd"
             version="3.0">
   ...
</portlet-app>
```

Annotation example:

The `@PortletApplication version` element is set to the value `"3.0"` by default and needs not be further declared.

28.1.2 Custom Portlet Mode

The custom portlet mode configuration data consists of the mandatory custom portlet mode name, an optional flag that indicates whether the custom portlet mode is managed by the portal or by the portlet, and an optional set of localized description strings. Each custom portlet mode name must be unique within the configuration.

Within the portlet deployment descriptor `<custom-portlet-mode>` element, this data is represented by the `<portlet-mode>`, `<portlet-managed>`, and `<description>` elements, respectively.

Deployment descriptor usage example declaring an `admin` custom portlet mode:

```
<portlet-app>
  ...
  <custom-portlet-mode>
    <description>Provides administration functions</description>
    <description xml:lang="de">Verwaltungsfunktionen</description>
    <portlet-mode>admin</portlet-mode>
    <portal-managed>true</portal-managed>
  </custom-portlet-mode>
</portlet-app>
```

The `@PortletApplication` annotation uses an array of `CustomPortletMode` elements to define the custom portlet modes. Each defined `CustomPortletMode` element must contain a mandatory `name` element to define the custom portlet mode name, an optional boolean `portalManaged` flag that defaults to true, and an optional array of localized `description` elements.

Annotation usage example declaring an `admin` custom portlet mode:

```
@PortletApplication(customPortletModes={
      @CustomPortletMode(description={
            @LocaleString("Provides administration functions"),
            @LocaleString(locale="de", value="Verwaltungsfunktionen")
      },
      name = "admin",
      portalManaged=true)
})
```

28.1.3 Custom Window State

The custom window state configuration data consists of the mandatory custom window state name and an optional set of localized description strings.

Each custom window state name must be unique within the configuration.

Within the portlet deployment descriptor `<custom-window-state>` element, this data is represented by the `<window-state>` and `<description>` elements, respectively.

Deployment descriptor usage example declaring a `half_page` custom window state:

```
<portlet-app>
  ...
  <custom-window-state>
    <description>Occupies 50% of the portal page</description>
    <window-state>half_page</window-state>
  </custom-window-state>
  ...
</portlet-app>
```

The `@PortletApplication` annotation uses an array of `CustomWindowState` elements to define the custom window states. Each defined `CustomWindowState` element must contain a mandatory `name` element to define the custom portlet mode name and an optional array of localized `description` elements.

Annotation usage example declaring an `admin` custom portlet mode:

```
@PortletApplication(
      customWindowStates = {
            @CustomWindowState(description = {
                  @LocaleString("Occupies 50% of the portal page"),
                  @LocaleString(locale="de", value =
                              "Verwendet 50% der Portal-Seite")
            },
            name = "half_page")
})
```

28.1.4 User Attribute

The portlet application configuration should define the user attribute names used by the portlets in the portlet application.

When the portlet is deployed, the logical user attributes must be mapped to the corresponding user attributes offered by the runtime environment. The manner in which this mapping is performed is implementation-specific and outside the scope of this specification.

At runtime, the portlet container uses this mapping to allow portlets to access the user attributes. User attributes of the runtime environment not mapped as part of the deployment process should not be exposed to portlets.

Refer to Appendix C User Attribute Names on page 198 for a list of recommended names.

The portlet deployment descriptor provides the <user-attribute> element with its child elements <description> and <name> for user attribute declaration.

Portlet deployment descriptor usage example:

```
<portlet-app>
  …
  <user-attribute>
    <description>User Given Name</description>
    <name>user.name.given</name>
  </user-attribute>
  <user-attribute>
    <description>User Last Name</description>
    <name>user.name.family</name>
  </user-attribute>
  <user-attribute>
    <description>User eMail</description>
    <name>user.home-info.online.email</name>
  </user-attribute>
  <user-attribute>
    <description>Company Organization</description>
    <name>user.business-info.postal.organization</name>
  </user-attribute>
  …
<portlet-app>
```

Annotation usage example:

```
@PortletApplication(
   userAttributes = {
      @UserAttribute(
         description = @LocaleString("User Given Name"),
         name = "user.name.given"
      ),
      @UserAttribute(
         description = @LocaleString("User Last Name"),
         name = "user.name.family"
      ),
      @UserAttribute(
         description = @LocaleString("User eMail"),
         name = "user.home-info.online.email"
      ),
      @UserAttribute(
         description = @LocaleString("Company Organization"),
         name = "user.business-info.postal.organization"
      ),
   },
)
```

28.1.5 Resource Bundle

As an alternative to embedding all localized values in the deployment descriptor or the configuration annotations, the portlet can provide a separate resource bundle containing the localized values. Providing localized values via resource bundles is preferred, as it allows the separation of deployment descriptor values from localized values.

The Portlet Specification defines localized information at both the portlet application and the portlet level. This section describes the localized information for the portlet application level. A later section will describe the localized information at the portlet level.

The Java Portlet Specification defines the following constants for the application level resource bundle:

`javax.portlet.app.custom-portlet-mode.<portlet-mode>.description`	Description of custom portlet mode <portlet-mode>.
`javax.portlet.app.custom-window-state.<window-state>.description`	Description of the custom window state <window-state>.
`javax.portlet.app.user-attribute.<name>.description`	Description of the user attribute <name>.
`javax.portlet.app.event-definition.<name>.description`	Description of the event <name>. <name> uses the string representation of the Java `QName` class with `{namespace}localpart`[35].
`javax.portlet.app.event-definition.<name>.display-name`	Name under which this event is displayed to users or to tools. The display name need not be unique. <name> uses the string representation of the Java `QName` class with `{namespace}localpart`[35].
`javax.portlet.app.public-render-parameter.<name>.description`	Description of the public render parameter <name>.
`javax.portlet.app.public-render-parameter.<name>.display-name`	Name under which this public render parameter is displayed to users or to tools. The display name need not be unique.

For language-specific portlet application level information, the fully qualified class name of the resource bundle can be set in the deployment descriptor using the `<resource-bundle>` element on the portlet application level. The `@PortletApplication` annotation provides the `resourceBundle` element for setting the resource bundle.

Portlet deployment descriptor usage example:

```
<portlet-app>
  ...
  <resource-bundle>com.acme.portlets.DisplayPortlet</resource-bundle>
  ...
</portlet-app>
```

Annotation usage example:

```
@PortletApplication(
   resourceBundle="com.acme.portlets.DisplayPortlet",
)
```

28.1.6 Filter Configuration

The portlet deployment descriptor allows for filter configuration through use of the `<filter>` and `<filter-mapping>` elements. The `@PortletApplication` annotation does not possess

[35] If the namespace is missing, the defined default namespace is assumed. Note that the resource bundle name must comply with the `java.util.Property.store` method, i.e. the ":" must be escaped.

corresponding elements. Instead, the `@PortletRequestFilter` annotation combines the function of both the `<filter>` and `<filter-mapping>` elements.

See Section 17.2.4 Filter Configuration on page 102 for filter configuration discussion and examples.

28.1.7 Default Namespace URI

The Portlet Specification makes use of qualified names (QNames)[36] to uniquely identify portlet events and public render parameters. The qualified name consists of a local part and a namespace URI. When an event or public render parameter is declared, both the local part and the namespace URI must be provided.

Instead of specifying a namespace URI each time an event or public render parameter is declared, the developer can declare a default namespace URI through the portlet deployment descriptor `<default-namespace>` element or through the `@PortletApplication defaultNamespaceURI` element. If the default namespace URI is specified, the portlet container must use the provided value as the default for the namespace URI portion of qualified names identifying portlet events and public render parameters.

The default namespace URI may be configured a maximum of one time.

Portlet deployment descriptor usage example:

```
<portlet-app>
   ...
   <default-namespace>
      http://www.apache.org/portals/portlets/DemoPortlet
   </default-namespace>
   ...
</portlet-app>
```

Annotation usage example:

```
@PortletApplication(
   defaultNamespaceURI="http://www.apache.org/portals/portlets/DemoPortlet",
)
```

28.1.8 Event Configuration

The portlet should declare events at the application level to make the event payload types known to the portlet container and to allow a description to be provided. The event configuration data at the application level consists of the mandatory event qualified name[36], the optional event payload type, optional event qualified name aliases, the optional localized display name strings, and the optional localized description strings.

The portlet container must enforce uniqueness of the event qualified name at the portlet application level.

[36] Qualified names are defined and discussed in detail in the following documents:

- XML Schema Part2: Datatypes specification (http://www.w3.org/TR/xmlschema-2/#QName)
- Namespaces in XML (http://www.w3.org/TR/REC-xml-names/#ns-qualnames),
- Namespaces in XML Errata (http://www.w3.org/XML/xml-names-19990114-errata),
- TAG Finding: Using Qualified Names (QNames) as Identifiers in Content (http://www.w3.org/2001/tag/doc/qnameids-2002-06-17).

The event configuration is continued at the portlet configuration level, where the specific events published and processed by the portlet are declared.

Portlet container or portal defined events do not need to be declared on the application level, but can be directly referenced at the portlet configuration level.

For further discussion about events, see Chapter 18 Coordination between Portlets on page 106.

The portlet deployment descriptor provides the `<event-definition>` element for event declaration.

Within the `<event-definition>` element, either the `<name>` element or the `<qname>` element can be used to specify the qualified name. The `<qname>` element allows specification of both the qualified name local part and the namespace URI. The `<name>` element allows the qualified name local part to be specified. If the `<name>` element is used, the portlet container must take the namespace URI for the portlet event qualified name to be the default namespace URI (discussed above) if it is defined, otherwise it must take the namespace URI to be the constant value `javax.xml.XMLConstants.NULL_NS_URI`.

Portlet developers are encouraged to organize the local part of the event names declared in the event definitions in a hierarchical manner using the dot `'.'` as separator. The portlet must not specify events with the same name but different types. The event name local part should not end with a trailing `'.'` character as wildcards are not supported in the event definition.

Within the `<event-definition>` element, the `<value-type>` element configures the event payload, and may appear a maximum of one time. The `<description>`, `<display-name>`, and `<alias>` elements configure the localized description strings, the localized display name strings, and the alias qualified names, respectively, for the event, and can be repeated any required number of times.

Portlet deployment descriptor usage example:

```
<portlet-app>
   ...
   <event-definition>
      <qname xmlns:x="http:example.com/events">x:foo.bar</qname>
      <value-type>com.example.Address</value-type>
   </event-definition>
   ...
</portlet-app>
```

The `@PortletApplication` annotation provides the `events` element for event declaration which is an array of `EventDefinition` objects. The `EventDefinition` object contains corresponding data elements for declaration of a single event.

Annotation usage example:

```
@PortletApplication(
   events = {
      @EventDefinition(
         qname = @PortletQName(
            namespaceURI = "http:example.com/events",
            localPart = "foo.bar"),
         payloadType = Address.class)
      },
)
```

28.1.9 Public Render Parameters

The portlet must declare public render parameters used within the portlet application at the application level to make the public render parameter identifier used within the portlet application known to the portlet container. The public render parameter identifier is the render parameter name under which the portlet can access the public render parameter.

The public render parameter configuration data at the application level consists of the mandatory public render parameter qualified name[36], the mandatory identifier, the optional localized display name strings, and the optional localized description strings.

The portlet container must enforce uniqueness of the public render parameter qualified name at the application level.

The public render parameter configuration is continued at the portlet configuration level, where the specific public render parameters used by each portlet are defined.

For further discussion about events, see Section 12.2.1 Public Render Parameters on page 65.

The portlet deployment descriptor provides the `<public-render-parameter>` element for public render parameter declaration.

Within the `<public-render-parameter>` element, either the `<name>` element or the `<qname>` element can be used to specify the qualified name. The `<qname>` element allows specification of both the qualified name local part and the namespace URI. The `<name>` element allows the qualified name local part to be specified. If the `<name>` element is used, the portlet container must take the namespace URI to be the default namespace URI (discussed above) if it is defined, otherwise it must take the namespace URI to be the constant value `javax.xml.XMLConstants.NULL_NS_URI`.

Also, the `<identifier>` element configures the public render parameter identifier, and may appear a maximum of one time. The `<description>` and `<display-name>` elements configure the localized description strings and the localized display name strings, respectively, for the public render parameter, and can be repeated any required number of times.

Portlet deployment descriptor usage example:

```
<portlet-app>
   ...
   <public-render-parameter>
      <identifier>imgName</identifier>
      <qname xmlns:rp="http:example.com/PRPs">rp:imgName</qname>
   </public-render-parameter>
   ...
</portlet-app>
```

The `@PortletApplication` annotation provides the `publicParams` element, which is an array of `PublicRenderParameterDefinition` objects, for public render parameter declaration. The

`PublicRenderParameterDefinition` object contains corresponding data elements for declaration of a single public render parameter.

Annotation usage example:

```
@PortletApplication(
   publicParams = {
      @PublicRenderParameterDefinition(
          qname = @PortletQName(
             namespaceURI = "http:example.com/PRPs",
             localPart = "imgName"),
          identifier = "imgName"
       ),
   },)
```

28.1.10 Portlet URL Generation Listener

The portlet deployment descriptor allows for portlet URL generation listener configuration through use of the `<listener>` element. The `@PortletApplication` annotation does not possess corresponding elements. Instead, the `@PortletURLGenerationListener` annotation provides the function of the `<listener>` element and its children.

See Section 14.6 The Portlet URL Generation Listener on page 77 for portlet URL generation listener configuration discussion and examples.

28.1.11 Conditional Dispatcher

The portlet deployment descriptor allows for conditional dispatcher configuration through use of the `<conditional-dispatcher>` element. The `@PortletApplication` annotation does not possess corresponding elements. Instead, the `@ConditionalDispatchMethod` annotation provides the function of the `<conditional-dispatcher>` element and its children.

See Chapter 5 Conditional Dispatching on page 40 for portlet conditional dispatcher configuration discussion and examples.

28.1.12 Portlet Container Runtime Options

Portlet container runtime options are name-value pairs that influence the operation of the portlet container. See Section 9.4 Portlet Container Runtime Options for discussion. Portlet container runtime options can be configured on the portlet application level, where they affect all portlets in the portlet application, or on the portlet level, where they affect only the specific portlet. Configuration at the portlet level will be discussed in a later section.

The portlet deployment descriptor allows configuration of portlet runtime options through the `<container-runtime-option>` element, which has mandatory `<name>` and `<value>` child elements. The `@PortletApplication` annotation allows configuration of the portlet container runtime options through the `runtimeOption` element, which contains a corresponding array of name-value pairs.

The portlet container must enforce uniqueness of the portlet container runtime option keys within the portlet application.

Portlet deployment descriptor usage example:

```
<portlet-app>
   ...
   <container-runtime-option>
      <name>javax.portlet.renderHeaders</name>
      <value>true</value>
   </container-runtime-option>
  ...
</portlet-app>
```

Annotation usage example:

```
@PortletApplication(
   runtimeOptions = {
      @RuntimeOption(name = "javax.portlet.renderHeaders", value = "true")
   },
)
```

28.2 Portlet Configuration

The `@PortletConfiguration` annotation provides configuration data for the portlet. It is a type annotation that can be applied to any valid managed bean in the portlet application. It has a single required `portletName` element that specifies the portlet name and many optional elements for configuration data. The optional elements provide defaults that should be applicable in many situations.

The portlet container must enforce uniqueness of the portlet name within the portlet application.

If `@PortletConfiguration` annotates a class that directly or indirectly implements the `Portlet` interface, the portlet container must register the class as a portlet class under the given portlet name, and call all of the implemented portlet lifecycle methods from the `Portlet`, `EventPortlet`, and `ResourceServingPortlet` interfaces as described in Chapter 4 Portlet Lifecycle Interfaces. An example annotated portlet class:

```
@PortletConfiguration(portletName="TestPortlet4")
public class AnnotatedGenericPortlet extends GenericPortlet {
   // add portlet methods
}
```

The portlet class may be both annotated with a `@PortletConfiguration` annotation and specified in one or more deployment descriptor portlet definitions as long as different portlet names are provided for each declared portlet.

If `@PortletConfiguration` annotates a class that does not implement the `Portlet` interface, the portlet container must register the configuration for the given portlet name. Since the portlet lifecycle methods defined by the `Portlet` interface are not available, the portlet must use the extended annotation-based dispatching functionality as described in Section 4.8 Extended Annotation-Based Dispatching. An example extended annotation-based dispatching class:

```
@PortletConfiguration(portletName="TestPortlet3")
public class MessageBoxPortlet {
}
```

If the same portlet name is specified in both the `@PortletConfiguration` annotation and in a portlet deployment descriptor `<portlet>` element, the portlet container aggregate the configuration values from the portlet deployment descriptor with those provided through the `@PortletConfiguration` annotation, with the values from the portlet deployment descriptor

taking precedence. For example, the value of a portlet initialization parameter with a given key for a given portlet name defined in the portlet deployment descriptor must take precedence over a value for the same portlet initialization parameter key and portlet name provided through the `@PortletConfiguration` annotation.

However, when configuration data is provided through the `@PortletConfiguration` annotation, that annotation determines the portlet class or the portlet dispatching methods as described above. The portlet class or dispatching methods cannot be overridden through portlet deployment descriptor `<portlet>` entry with the same portlet name. In this case, the `<portlet-class>` element should not be present. If the portlet deployment descriptor `<portlet-class>` element is present, the portlet container must recognize the configuration error, but is free to either ignore the portlet deployment descriptor `<portlet-class>` element or reject the portlet at deployment time.

The portlet container must support configuration of multiple portlets within a portlet application through use of the `@PortletConfiguration` annotation applied to different portlet classes.

28.2.1 `@PortletConfigurations` Annotation

The developer may sometimes need to configure more than one portlet for a given portlet class. Since Java SE Version 7 and earlier does not allow multiple annotations of the same type to be present on the same annotated artifact, the Portlet Specification provides the `@PortletConfigurations` annotation for that purpose.

The `@PortletConfigurations` annotation contains an array of `@PortletConfiguration` annotations. The portlet container must process each `@PortletConfiguration` annotation in the array in the manner described above, registering a portlet for each array element.

If the portlet application is using extended annotation-based dispatching rather than the portlet lifecycle methods provided by the `Portlet` interface, the `@PortletConfigurations` annotation can be used to consolidate portlet configuration information into a common location.

The portlet container must support use of the `@PortletConfigurations` annotation multiple times within a portlet application.

28.2.2 Portlet Container Runtime Options

As discussed in a previous section, portlet container runtime options can be configured on the portlet application level, where they affect all portlets in the portlet application, or on the portlet level, where they affect only the specific portlet. Portlet container runtime options configured at the portlet level override portlet container runtime options of the same name configured at the portlet application level.

The portlet deployment descriptor allows configuration of portlet runtime options through the `<container-runtime-option>` element, which has mandatory `<name>` and `<value>` child elements. The `@PortletConfiguration` annotation allows configuration of the portlet container runtime options through the `runtimeOption` element, which contains a corresponding array of name-value pairs.

The portlet container must enforce uniqueness of the portlet container runtime option keys for the portlet.

Portlet deployment descriptor usage example:

```
<portlet>
   ...
   <container-runtime-option>
      <name>javax.portlet.renderHeaders</name>
      <value>true</value>
   </container-runtime-option>
  ...
</portlet>
```

Annotation usage example:

```
@PortletConfiguration(
   runtimeOptions = {
      @RuntimeOption(name = "javax.portlet.renderHeaders", value = "true")
   },
)
```

28.2.3 Portlet Initialization Parameters

Portlet initialization parameters are name-value pairs for use by the portlet. The portlet can access the portlet initialization parameters through the `PortletConfig` object. See Section 7.1 Initialization Parameters. Each portlet initialization parameter name-value pair may also have an associated array of localized descriptions strings..

The portlet container must enforce uniqueness of the portlet initialization parameter names for the portlet. The name may not be `null`.

The portlet deployment descriptor provides the `<init-param>` element for portlet initialization parameter declaration. It in turn contains the localized `<description>` element, which can be repeated as necessary, the `<name>` element for specification of the name, and the `<value>` element for specification of the value.

Portlet deployment descriptor usage example:

```
<portlet>
…
    <init-param>
           <name>city</name>
           <value>New York</value>
    </init-param>
    <init-param>
           <name>zip</name>
           <value>10001</value>
    </init-param>
</portlet>
```

The `@PortletConfiguration` annotation provides the `initParams` element, which contains an array of `InitParameter` elements, each of which contains corresponding fields for the localized description, the name, and the value.

Annotation usage example:

```
@PortletConfiguration(portletName="TestPortlet4", initParams={
      @InitParameter(name="city", value="New York"),
      @InitParameter(name="zip", value="10001")
})
```

28.2.4 Portlet Identification

The portlet configuration contains information to identify and categorize the portlet. It consists of the mandatory portlet name, the optional portlet class, and the optional localized display name, description, title, short title, and keywords strings. See Section 7.2 Portlet Resource Bundle for additional information on the latter three items.

Within the portlet deployment descriptor, the portlet name, portlet class, display name, and description strings are configured through the `<portlet>` child elements `<portlet-name>`, `<portlet-class>`, `<display-name>`, and `<description>`, respectively.

The title, short title, and keyword strings are configured through the `<portlet-info>` child elements `<title>`, `<short-title>`, and `<keyword>`, respectively. The `<portlet-info>` element is contained within the `<portlet>` element. Portlet deployment descriptor usage example:

```
  <portlet>
    <description xml:lang="en">
    Portlet displaying the time in different time zones</description>
    <description xml:lang="de">
    Dieses Portlet zeigt die Zeit in verschiedenen Zeitzonen an.
    </description>
    <portlet-name>TimeZoneClock</portlet-name>
    <display-name xml:lang="en">Time Zone Clock Portlet</display-name>
    <display-name xml:lang="de">ZeitzonenPortlet</display-name>
    <portlet-class>com.myco.samplets.util.zoneclock.ZoneClock</portlet-class>
...
    <portlet-info>
      <title>Time Zone Clock</title>
      <short-title>TimeZone</short-title>
      <keywords>Time, Zone, World, Clock</keywords>
    </portlet-info>
  </portlet>
```

The @PortletConfiguration annotation provides the portletName, description, displayName, title, shortTitle, and keywords elements for configuration of the identification items. The portlet class is determined as described in Section 28.2 Portlet Configuration oben.

Annotation usage example:

```
@PortletConfiguration(portletName="TimeZoneClock",
   description={
      @LocaleString("Portlet displaying the time in different time zones"),
      @LocaleString(locale="de",
         value="Dieses Portlet zeigt die Zeit in verschiedenen Zeitzonen an")
   }, displayName={
      @LocaleString("Time Zone Clock Portlet"),
      @LocaleString(locale="de", value="ZeitzonenPortlet")
   }, title={
      @LocaleString("Time Zone Clock")
   }, shortTitle={
      @LocaleString("TimeZone")
   }, keywords={
      @LocaleString("Time, Zone, World, Clock")
   }
)
```

28.2.5 Portlet Resource Bundle

Resource bundles can be used to provide language specific portlet-level information, like title and keywords. The fully qualified class name of the resource bundle can be set in the portlet definition in the deployment descriptor using the `resource-bundle` element.

The Java Portlet Specification defines the following constants for the portlet level resource bundle:

`javax.portlet.title`	The title that should be displayed in the title bar of this portlet. Only one title per locale is allowed. Note that this title may be overridden by the portal or programmatically by the portlet.
`javax.portlet.short-title`	A short version of the title that may be used for devices with limited display capabilities. Only one short title per locale is allowed.
`javax.portlet.keywords`	Keywords describing the functionality of the portlet. Portals that allow users to search for portlets based on keywords may use these keywords. Multiple keywords per locale are allowed, but must be separated by commas ‘,’.
`javax.portlet.description`	Description of the portlet.
`javax.portlet.display-name`	Name under which this portlet is displayed at deployment time or to tools. The display name need not be unique.
`javax.portlet.app.custom-portlet-mode.<name>.decoration-name`	Decoration name for the portlet managed custom portlet mode <name>.

For language-specific portlet level information, the fully qualified class name of the resource bundle can be set in the deployment descriptor within the `<portlet>` declaration using the `<resource-bundle>` element. The `@PortletConfiguration` annotation provides the `resourceBundle` element for setting the resource bundle.

Portlet deployment descriptor usage example:

```
<portlet>
  ...
  <resource-bundle>com.acme.portlets.DisplayPortlet</resource-bundle>
  ...
</portlet>
```

Annotation usage example:

```
@PortletConfiguration(
   resourceBundle="com.acme.portlets.DisplayPortlet",
)
```

28.2.5.1 Resource Bundle Example

This section shows the resource bundles for the world population clock portlet from the deployment descriptor example. The first resource bundle is for English and the second for German locales.

English Resource Bundle:

```
#
# filename: clock_en.properties
# Portlet Info resource bundle example
javax.portlet.title=World Population Clock
javax.portlet.short-title=WorldPopClock
javax.portlet.keywords=World,Population,Clock
```

German Resource Bundle:

```
#
# filename: clock_de.properties
# Portlet Info resource bundle example
javax.portlet.title=Weltbevölkerungsuhr
javax.portlet.short-title=Weltuhr
javax.portlet.keywords=Welt,Bevölkerung,Uhr
```

28.2.6 Cache Settings

The portlet configuration allows declaration of the cache expiration and cache scope values supported by the portlet as defined in Chapter 23 Caching on page 141.

In the following examples, the content should be cached for 5 minutes (300 seconds) and must not be shared across users.

The portlet deployment descriptor provides the `<expiration-cache>` and `<cache-scope>` elements for cache setting configuration.

Portlet deployment descriptor usage example:

```
<portlet>
  ...
   <expiration-cache>300</expiration-cache>
   <cache-scope>private</cache-scope>
  ...
</portlet>
```

The `@PortletConfiguration` annotation provides the `cacheExpirationTime` and `cacheScopePublic` elements for cache setting configuration. If the `cacheScopePublic` element is set to `true`, cached information can be shared between users. The default is `false`.

Annotation usage example:

```
@PortletConfiguration(
   cacheExpirationTime = 300,
   cacheScopePublic = false,
)
```

28.2.7 Security Role Reference

The portlet configuration allows declaration of security role references as described in Section 24.3 Programmatic Security on page 143. A security role reference contains a mandatory role name and an optional role link. The security role reference can be repeated as many times as needed.

The portlet container must enforce uniqueness of the security role names within the portlet configuration.

The portlet deployment descriptor provides the `<security-role-ref>` element with its child elements <role-name> and `<role-link>` elements for security role reference configuration.

Portlet deployment descriptor usage example:

```
<portlet>
   ...
   <security-role-ref>
       <role-name>FOO</role-name>
       <role-link>manager</role-link>
   </security-role-ref>
   ...
</portlet>
```

The `@PortletConfiguration` annotation provides the `roleRefs` for role reference configuration.

Annotation usage example:

```
@PortletConfiguration(
   roleRefs = @SecurityRoleRef(roleName="FOO", roleLink="manager"),
)
```

28.2.8 Dependencies

The portlet configuration allows declaration of dependencies the portlet may have on external resources. The resources represent client-side prerequisites such as JavaScript libraries or stylesheet resources that are shared among portlets. A dependency is declared through mandatory resource name and minimum acceptable version strings. Generally the name should be the known common name for the resource, such as `angular` or `bootstrap` and the version string should be in a format appropriate to the resource, although the mechanism can be used for proprietary portal or application resources as well.

When dependencies are configured, the portal system should take the appropriate measures to make the resources available to the portlet on the client.

The way the portal system is configured to provide the resources and the way it actually provides the resources to the portlet are beyond the scope of this specification.

The portlet deployment descriptor provides the `<dependency>` element and its child elements `<name>` and `<min-version>` for dependency configuration. The `<dependency>` element can be repeated as required.

Portlet deployment descriptor usage example:

```
<portlet>
   ...
   <dependency>
      <name>angular</name>
      <min-version>1.3</min-version>
   </dependency>
   ...
</portlet>
```

The `@PortletConfiguration` annotation provides the `dependencies` element for dependency configuration.

Annotation usage example:

```
@PortletConfiguration(
   dependencies = @Dependency(name = "angular", minVersion = "1.3"),
)
```

28.2.9 Public Render Parameter References

The portlet developer must declare the public render parameter definitions used in the portlet application in the portlet application configuration as previously described. Each individual portlet within the portlet application must declare the public render parameters it uses by referencing the identifiers from the public render parameter definitions.

The portlet container must assure that the public render parameter identifiers declared in the portlet configuration are valid and are declared in the portlet application configuration. If this is not the case, the portlet container should reject the portlet at deployment time and provide the user with an appropriate error message.

The portlet deployment descriptor <portlet> element provides the `<supported-public-render-parameter>` child element for this purpose.

Portlet deployment descriptor usage example:

```
<portlet>
  ...
   <supported-public-render-parameter>
      imgName
   </supported-public-render-parameter>
  ...
</portlet>
```

The `@PortletConfiguration` annotation provides the `publicParams` element for declaring the public render parameters.

Annotation usage example:

```
@PortletConfiguration(
   publicParams = {"imgName"},
)
```

Public render parameters can also be declared implicitly for a portlet by using a `@PortletStateScoped` bean. Such beans are represented in the portlet state as a render parameter. See Section 21.2.2 Portlet State Scope on page 119 for more information.

The `@PortletStateScoped` annotation allows a parameter name to be specified. If the parameter name matches a public render parameter identifier as declared in the portlet application configuration, the portlet container must treat the render parameter representing the

bean as a public render parameter for all portlets within the portlet application in which the bean is used.

A portlet that uses such an `@PortletStateScoped` bean will be implicitly using a public render parameter. In this case, the public render parameter identifier is not required to be explicitly declared in the `@PortletConfiguration publicParams` element.

Annotation usage example:

```
@PortletStateScoped(paramName = "imgName")
public class ImageBean implements PortletSerializable {

}
```

28.2.10 Event References

The portlet developer must declare the event definitions used in the portlet application in the portlet application configuration as previously described. Each individual portlet within the portlet application must declare the events it can process and those it publishes by referencing the qualified names from the event definitions.

The portlet deployment descriptor provides the `<supported-publishing-event>` and `<supported-processing-event>` elements for publishing and processing event configuration. Within these elements, either the `<name>` element or the `<qname>` element can be used to specify the qualified name. The `<qname>` element allows specification of both the qualified name local part and the namespace URI. The `<name>` element allows the qualified name local part to be specified. If the `<name>` element is used, the portlet container must take the namespace URI for the portlet event qualified name to be the default namespace URI if it is defined, otherwise it must take the namespace URI to be the constant value `javax.xml.XMLConstants.NULL_NS_URI`.

The event declaration within the portlet configuration supports the dot `'.'` as a wildcard character on the qualified name local part. A trailing `'.'` tells the portlet container that the portlet is interested in all events with names in this branch of the hierarchy. The portlet container must not treat a `'.'` character appearing within a qualified name local part at a location other than the end of the string as a wildcard character.

The portlet container should be able to resolve a portlet event declaration in the portlet configuration ending with the wildcard character to an event definition without wildcards by matching event name local parts ending with a `'.'` character to any event definition whose event name local part starts with the characters before the `'.'` character specifying the same namespace. If this is not the case, the portlet container must recognize the configuration error and not place the portlet in service.

Portlet deployment descriptor usage example:

```
<portlet>
   ...
   <supported-publishing-event>
      <qname xmlns:x="http:example.com/events">x:foo.bar</qname>
   </supported-publishing-event>
   <supported-processing-event>
      <qname xmlns:x="http:example.com/events">x:foo.bar</qname>
   </supported-processing-event>
   ...
</portlet>
```

The `@PortletConfiguration` annotation does not provide means for portlet event configuration.

Instead, the `@ActionMethod` annotation applied to the action processing method provides the `publishingEvents` element for configuring the events published by the action method. The `@EventMethod` annotation applied to the event processing method provides the `publishingEvents` and `processingEvents` elements for configuring the events published and processed by the event method. See Sections 4.7.2 Action Dispatching on page 31 and 4.7.3 Event Dispatching on page 31 for more information on these annotations.

`@ActionMethod` usage example:

```
@ActionMethod(portletName = "BeanPortletA",
      publishingEvents = @PortletQName(
            localPart="foo.bar",
            namespaceURI = "http:example.com/events"))
public void setPrefs(ActionRequest request, ActionResponse response) {
   ...
}
```

`@EventMethod` usage example:

```
@EventMethod(portletName = "BeanPortletA",
   processingEvents = @PortletQName(
      localPart="Message",
      namespaceURI = "http:example.com/events"),
   publishingEvents = @PortletQName(
      localPart="foo.bar",
      namespaceURI = "http:example.com/events"))
public void processEvent(EventRequest request, EventResponse response)
                        throws PortletException ,IOException {
   ...
}
```

28.2.11 Conditional Dispatcher

The portlet deployment descriptor allows for conditional dispatcher configuration through use of the `<conditional-dispatcher>` element. The `@PortletConfiguration` annotation does not possess corresponding elements. Instead, the `@ConditionalDispatchMethod` annotation provides the function of the `<conditional-dispatcher>` element and its children.

Configuration of a conditional dispatcher in the portlet configuration overrides any conditional dispatcher configuration in the portlet application section.

See Chapter 5 Conditional Dispatching on page 40 for portlet conditional dispatcher configuration discussion and examples.

28.2.12 Supported Locales

The portlet configuration allows declaration of the locales supported by the portlet. The locale is specified as a language tag as defined in IETF BCP 47[37]. The language tag may contain wildcard characters as described in IETF BCP 47.

The portlet deployment descriptor provides the `<supported-locale>` element for locale declaration. It can be repeated as often as required.

Portlet deployment descriptor usage example:

```
<portlet>
  ...
  <supported-locale>en</supported-locale>
  <supported-locale>de</supported-locale>
  ...
</portlet>
```

The `@PortletConfiguration` annotation `supportedLocale` element allows configuration of the supported locales.

Annotation usage example:

```
@PortletConfiguration(portletName="ConfigTestPortlet",
   supportedLocales = {"en", "de"},
)
```

28.2.13 Portlet Modes and Window States

The portlet configuration allows the portlet modes and custom window supported by the portlet for each markup type to be specified according to the rules defined in Section 10.5 Defining Portlet Modes Support and Section 11.5 Defining Window State Support.

The portlet deployment descriptor allows the <supports> element to be specified once for each supported content type. Within the <supports> element, the <mime-type> element must be configured once to declare the supported content type. The <portlet-mode> and <window-state> elements can be repeated as necessary to declare the supported portlet modes and window states.

Portlet deployment descriptor usage example:

For HTML markup, this portlet supports the `HALF-PAGE` window state in addition to the required pre-defined window states. For WML markup, it supports only the pre-defined window states.

[37] See IETF BCP 47, "Tags for Identifying Languages", https://tools.ietf.org/html/bcp47

```
<portlet>
  ...
  <supports>
    <mime-type>text/html</mime-type>
    <portlet-mode>edit</portlet-mode>
    <portlet-mode>help</portlet-mode>
    <window-state>half-page</window-state>
    ...
</supports>
<supports>
    <mime-type>text/vnd.wap.wml</mime-type>
    <portlet-mode>help</portlet-mode>
    ...
</supports>
  ...
</portlet>
```

The `@PortletConfiguration` annotation `supports` element provides corresponding fields for portlet mode and window state configuration. The `mimeType` element default is `"text/html"`.

Annotation usage example:

```
@PortletConfiguration(portletName="ConfigTestPortlet",
      supports = {
            @Supports(portletModes={"help", "edit"},
                  windowStates="half_page"),
            @Supports(mimeType="text/vnd.wap.wml", portletModes="help")
      })
```

28.2.14 Portlet Preferences

Portlet preferences are name-value pairs that the portlet can use to store persistent preference data, where the values are string arrays. The portlet can access the portlet initialization parameters through the `PortletRequest` object. See Chapter 19 Portlet Preferences for more information.

The portlet configuration can provide portlet preference names along with their corresponding values read-only flags.

The portlet container must enforce uniqueness of the portlet preference names for the portlet.

The portlet deployment descriptor `<portlet-preferences>` element, which contains a `<portlet-preference>` element for each portlet preference to be declared, along with an optional `<preference-validator>` element for declaring a portlet preferences validator.

Each `<portlet-preference>` element allows configuration of the name, values, and read-only flag for a single portlet using the `<name>`, `<value>`, and `<read-only>` elements, respectively. The `<value>` element can be repeated once for each string in the portlet preference values array.

Section 19.4 Validating Preference Values on page 113 describes the portlet preferences validator configuration using either the portlet deployment descriptor or annotations.

Portlet deployment descriptor usage example:

```
<portlet>
...
  <!-- Portlet Preferences -->
  <portlet-preferences>
    <preference>
      <name>PreferredStockSymbols</name>
      <value>FOO</value>
      <value>XYZ</value>
      <read-only>true</read-only>
    </preference>
    <preference>
      <name>quotesFeedURL</name>
      <value>http://www.foomarket.com/quotes</value>
    </preference>
  </portlet-preferences>
</portlet>
```

The `@PortletConfiguration` annotation `prefs` element provides corresponding fields for portlet preference configuration.

Annotation usage example:

```
@PortletConfiguration(portletName="ConfigTestPortlet",
      prefs = {
         @Preference(
            name = "PreferredStockSymbols",
            values = {"FOO", "XYZ"},
            isReadOnly = true),
         @Preference(
               name = "quotesFeedURL",
               values = {"http://www.foomarket.com/quotes"})
      },
)
```

Appendix A Change History

A.1 Version 3.0 Changes

- Chapter 27 Packaging and Deployment: Editorial changes. Removed portlet deployment descriptor schema.
- Chapter 24 Security: Editorial changes. Do we need this chapter?
- Chapter 23 Caching: Editorial changes.
- **Error! Reference source not found. Error! Reference source not found.**: Editorial changes. Do we need this chapter?
- Chapter 17 Portlet Filters: Editorial changes, added configuration through annotations.
- Chapter 22 Client-Side Support: New chapter. Describes client-side support provided by the portlet hub.
- Chapter 21 Managed Bean Support: New chapter. Describes portlet initialization through the CDI container, custom scopes for portlets, and portlet artifacts as injectable predefined beans.
- Chapter 20 Sessions: Editorial changes.
- Chapter 19 Portlet Preferences: Editorial changes. Added annotation-based configuration for preferences validator.
- Chapter 18 Coordination between Portlets: Editorial changes.
- Integrated material from JSR 286 Chapters "Fragment Serving" and Resource Serving" into the appropriate spec sections. These will not exist in the new specification as separate chapters in order to reduce redundancy and to group similar information accordingly.
- Chapter 16 PortletResponse Interfaces: Major rewrite to include to more accurately present JSR 362 concepts. Expanded introductory section. Added description for the URL creation methods. Added method on the action response to allow the portlet to request a redirect after action phase processing.
- Chapter 15 Portlet Request Interfaces: Major rewrite to include to more accurately present JSR 362 concepts. Expanded introductory section. Added PORTLET_STATE resource request attribute for partial action request support.
- Chapter 14 Portlet URLs: Major rewrite to add JSR 362 concepts. Added `ActionURL` and `RenderURL` interfaces. Added configuration of the portlet URL generation listener through annotations.
- Chapter 13 Portlet State: New chapter.
- Chapter 12 Portlet Parameters: New chapter.

- Chapter 11 Window States: Editorial changes. Changed language to refer to portlet configuration rather than to the portlet deployment descriptor. Moved portlet descriptor examples to configuration chapter.
- Appendix D Custom Portlet Modes: Editorial changes. Added examples for annotation-based configuration.
- Appendix B Markup Fragments: Editorial changes.
- Chapter 10 Portlet Modes: Editorial changes. Changed language to refer to portlet configuration rather than to the portlet deployment descriptor. Moved portlet descriptor examples to configuration chapter.
- Chapter 9 Portlet Context: Editorial changes.

  See PORTLETSPEC3-53 for discussion of further potential changes.
- Chapter 8 Portal Context: Editorial changes.
- Chapter 7 The PortletConfig Interface: Editorial changes to improve wording. Changed wording so as to refer to the 'portlet configuration' rather than to the 'portlet deployment descriptor.
  PORTLETSPEC3-18: Added method for obtaining public render parameter names and QNames under 'Public Render Parameters'. Added 'Portlet Modes' section. Added 'Window States' section.
- Chapter 6 Portlet Applications: Editorial changes. Updated servlet specification references to the appropriate sections of Servlet Specification Version 3.1.
- Chapter 4 Portlet Lifecycle Interfaces: Editorial changes to improve wording. Changed wording so as to refer to the 'portlet configuration' rather than to the 'portlet deployment descriptor' where appropriate, since JSR 362 allows configuration through annotations. Rewrote 'Portlet Customization Levels' section. Rewrote 'Request Handling' section. Considerable editorial changes to 'GenericPortlet' section. Added 'Dispatching to Annotated Methods' section explaining GenericPortlet dispatching.
- Chapter 3 Portlet Concepts: Major rewrite to include to more accurately present JSR 362 concepts. Expanded introductory section. Clarified relationship between the Portlet Specification, the portal system, and the portlet container. Clarified the portlet phase model. Provided more detail on portlet requests. Added client-side support concepts. Changed wording so as to refer to the 'portlet configuration' rather than to the 'portlet deployment descriptor' where appropriate, since JSR 362 allows configuration through annotations. Described portlet parameters and portlet state. Described portlet URLs. Discussed portlet phase execution. Discussed portlet lifecycle methods.
- Chapter 2 Relationship to the Servlet Specification: Editorial changes to improve wording. Updated minimum runtime environment version to 'Servlet Specification 3.1'.
- Chapter 1 Overview: Many editorial changes to improve language. Added 'Portlet State' section. Updated 'Compatibility' section. Moved change history to this appendix. Updated 'Relationship to Java Enterprise Edition' section to refer to target versions.
- Preface: Moved Chapter 1 from the JSR 286 document to be the new Preface. Updated the versions of the referenced Java specifications. Updated 'Other Important References section. Updated 'Providing Feedback' to refer to the JSR 362 mailing list. Streamlined 'Acknowledgements'.

- General: Restructured document to improve flow and layout.
- PLT7.1.1 PORTLETSPEC3-21: Added description of the BaseURL.write (Appendable) method.
- PLT6.2 PORTLETSPEC3-14: Added clarification about how the portlet title is defined if neither the <resource-bundle> nor the <portlet-info> elements are present in the portlet descriptor.
- PLT22.2 PORTLETSPEC3-19: Changed „doView" to „doHeaders" in the code example.
- PLT.26: PORTLETSPEC3-12; Clarified use of Portlet 1.0 Tag Library.
- PLT.11.1.4.3: PORTLETSPEC3-1: Clarified behavior when runtime setting renderHeaders is set to false.
- PLT.25.8.2: PORTLETSPEC3-6: Clarified how supported locales are to be specified.

A.2 Version 2.1.0 Changes

Version 2.1.0 is a maintenance release amending the description of Resource Serving Dispatching in section PLT.5.4.5.3. This change, along with the associated Portlet API version 2.1.0 jar file update, closes a potential security vulnerability associated with Common Vulnerabilities and Exposures ID CVE-2015-1926.

A.3 Version 2.0 Changes

This section provides an overview of changes introduced with Portlet Specification 2.0 as compared to version 1.0. For additional details, consult the JSR 286 Portlet Specification 2.0 document.

A.3.1 Major changes introduced with V 2.0

The major new features of version 2.0 include:

Events – enabling a portlet to send and receive events and perform state changes or send further events as a result of processing an event.

Public render parameters – allowing portlets to share parameters with other portlets.

Resource serving – provides the ability for a portlet to serve a resource.

Portlet filter – allowing on-the-fly transformations of information in both the request to and the response from a portlet.

A.3.2 Clarifications that may make V1.0 Portlets Non-compliant

Depending on the implementation of the portlet of a specific runtime behavior of a portlet container the following clarifications may lead to different results when executing a portlet in either a JSR 168 or a JSR 286 container:

XML escaping of portlet URLs produced via the portlet tag library. V 2.0 clarifies that the default is all portlet URLs are XML escaped. The default can be changed with the new attribute escapeXML. JSR 168 portlets depending on the fact that portlet URLs created via the tag library are not XML escaped can change the default to non-escaped via the portlet container runtime option javax.portlet.escapeXml (see PLT.26.7)

Defining multiple values for the same parameter name in the Portlet param tag. V 2.0 clarifies that if the same name of a parameter occurs more than once within an actionURL, renderURL or resourceURL the values must be delivered as parameter value array with the values in the order of the declaration within the URL tag. Portlets assuming that the last occurrence wins and replaces the previous set values will behave differently in V2.0 containers.

getProtocol for included servlets / JSPs no longer returns null. V 2.0 defines that getProtocol now returns 'HTTP/1.1' and thus is better aligned with the servlet model that expects the getProtocol to return this value in the GenericServlet.

Parameters set on the portlet URL and the post body are aggregated into the request parameter set. Portlet URL parameters are presented before post body data. JSR 168 did not define if and how post body and portlet URL parameters are being merged. The added clarification mirrors the behavior defined in the servlet specification for servlets.

RenderResponse.setContentType is no longer required before calling getWriter or getOutputstream. Calling getWriter or getOutputstream without previously setting the content type will no longer result in an IllegalStateException.

PortletURL.setParameter called with a null value as value did throw an IllegalStateException whereas in V2.0 it results in removing that parameter from the PortletURL.

Appendix B Markup Fragments

Portlets generate markup fragments that are aggregated in a portal page document. Because of this, there are some rules and limitations in the markup elements generated by portlets. Portlets should conform to these rules and limitations when generating content.

The disallowed tags indicated below are those tags that impact content generated by other portlets or may even break the entire portal page. Inclusion of such a tag invalidates the whole markup fragment.

Portlets generating HTML fragments must not use the following tags: `base`, `body`, `frame`, `frameset`, `head`, `html` and `title`. Using the `iframe` tag is not forbidden, but portlets using iframes should not expect portal/portlet context for the content of iframes.

Portlets generating XHTML and XHTML-Basic fragments must not use the following tags: `base`, `body`, `iframe`, `head`, `html` and `title`.

HTML, XHTML and XHTML-Basic specifications disallow the use of certain elements outside of the `<head>` element in the document. However, some browser implementations support some of these tags in other sections of the document. For example: current versions of Internet Explorer and Netscape Navigator both support the style tag anywhere within the document. Portlet developers should decide carefully the use of following markup elements that fit this description: `link`, `meta` and `style`.

Appendix C User Attribute Names

This appendix defines a set of attribute names for user information. Portlet developers should use these attribute names in order to promote portability. To allow portals an automated mapping of commonly used user information attributes portlet programmers should use these attribute names. These attribute names are derived from the Platform for Privacy Preferences 1.0 (P3P 1.0) Specification by the W3C (http://www.w3c.org/TR/P3P).

Attribute Name
user.bdate.ymd.year
user.bdate.ymd.month
user.bdate.ymd.day
user.bdate.hms.hour
user.bdate.hms.minute
user.bdate.hms.second
user.bdate.fractionsecond
user.bdate.timezone
user.gender
user.employer
user.department
user.jobtitle
user.name.prefix
user.name.given
user.name.family
user.name.middle
user.name.suffix
user.name.nickName
user.login.id
user.home-info.postal.name
user.home-info.postal.street
user.home-info.postal.city
user.home-info.postal.stateprov
user.home-info.postal.postalcode
user.home-info.postal.country
user.home-info.postal.organization
user.home-info.telecom.telephone.intcode
user.home-info.telecom.telephone.loccode
user.home-info.telecom.telephone.number
user.home-info.telecom.telephone.ext
user.home-info.telecom.telephone.comment
user.home-info.telecom.fax.intcode
user.home-info.telecom.fax.loccode
user.home-info.telecom.fax.number
user.home-info.telecom.fax.ext
user.home-info.telecom.fax.comment
user.home-info.telecom.mobile.intcode
user.home-info.telecom.mobile.loccode
user.home-info.telecom.mobile.number
user.home-info.telecom.mobile.ext
user.home-info.telecom.mobile.comment
user.home-info.telecom.pager.intcode
user.home-info.telecom.pager.loccode
user.home-info.telecom.pager.number
user.home-info.telecom.pager.ext
user.home-info.telecom.pager.comment
user.home-info.online.email
user.home-info.online.uri
user.business-info.postal.name

user.business-info.postal.street
user.business-info.postal.city
user.business-info.postal.stateprov
user.business-info.postal.postalcode
user.business-info.postal.country
user.business-info.postal.organization
user.business-info.telecom.telephone.intcode
user.business-info.telecom.telephone.loccode
user.business-info.telecom.telephone.number
user.business-info.telecom.telephone.ext
user.business-info.telecom.telephone.comment
user.business-info.telecom.fax.intcode
user.business-info.telecom.fax.loccode
user.business-info.telecom.fax.number
user.business-info.telecom.fax.ext
user.business-info.telecom.fax.comment
user.business-info.telecom.mobile.intcode
user.business-info.telecom.mobile.loccode
user.business-info.telecom.mobile.number
user.business-info.telecom.mobile.ext
user.business-info.telecom.mobile.comment
user.business-info.telecom.pager.intcode
user.business-info.telecom.pager.loccode
user.business-info.telecom.pager.number
user.business-info.telecom.pager.ext
user.business-info.telecom.pager.comment
user.business-info.online.email
user.business-info.online.uri

The `PortletRequest` interface provides these constants as an enum.

Appendix D Custom Portlet Modes

Portals may provide support for custom portlet modes. Similarly, portlets may use custom portlet modes. This appendix describes a list of custom portlet modes and their intended functionality. Portals and portlets should use these custom portlet mode names if they provide support for the described functionality.

Portlets should use the `getSupportedPortletModes` method of the `PortalContext` interface to retrieve the portlet modes the portal supports.

D.1 About Portlet Mode

The `about` portlet mode should be used by the portlet to display information on the portlets purpose, origin, version etc.

Portlet developers should implement the `about` portlet mode functionality by using the `@RenderMode(name="about")`[38] annotation supported by the `GenericPortlet` class.

In the deployment descriptor the support for the `about` portlet mode must be declared using

```
<portlet-app>
    ...
    <portlet>
           ...
           <supports>
                  ...
                  <portlet-mode>about</portlet-mode>
           </supports>
           ...
    </portlet>
    ...
    <custom-portlet-mode>
           <portlet-mode>about</portlet-mode>
    </custom-portlet-mode>
    ...
    </portlet-app>
```

The corresponding annotation-based configuration could appear as follows:

```
@PortletConfiguration(portletName="ConfigTestPortlet",
   supports = {
      @Supports(locale="de", portletModes={"about"})
   },
   customPortletModes = {
      @CustomPortletMode(description="about the portlet", name="about")
   })
```

D.2 Config Portlet Mode

The `config` portlet mode should be used by the portlet to display one or more configuration views that let administrators configure portlet preferences that are marked non-modifiable in

[38] See Section 4.7.1 Dispatching to `GenericPortlet` Annotated Methods

the deployment descriptor. This requires that the user must have administrator rights. Therefore, only the portal can create links for activating the `config` portlet mode.

Portlet developers should implement the `config` portlet mode functionality by using the `@RenderMode(name="config")`[38] annotation supported by the `GenericPortlet` class.

The `CONFIG` mode of portlets operates typically on shared state that is common to many portlets of the same portlet definition. When a portlet modifies this shared state via the `PortletPreferences`, for all affected portlet entities, in the `doView` method the `PortletPreferences` must give access to the modified state.

In the deployment descriptor the support for the `config` portlet mode must be declared using

```
<portlet-app>
    ...
    <portlet>
           ...
           <supports>
                  ...
                  <portlet-mode>config</portlet-mode>
           </supports>
           ...
    </portlet>
    ...
    <custom-portlet-mode>
           <portlet-mode>config</portlet-mode>
    </custom-portlet-mode>
    ...
    </portlet-app>
```

The corresponding annotation-based configuration could appear as follows:

```
@PortletConfiguration(portletName="ConfigTestPortlet",
   supports = {
      @Supports(locale="de", portletModes={"config"})
   },
   customPortletModes = {
      @CustomPortletMode(name="config")
   })
```

D.3 Edit_defaults Portlet Mode

The `edit_defaults` portlet mode signifies that the portlet should render a screen to set the default values for the modifiable preferences that are typically changed in the `EDIT` screen. The user must have the proper access rights to activate this mode. Therefore, only the portal can create links for activating `edit_defaults` mode.

Portlet developers should implement the `edit_defaults` portlet mode functionality by using the `@RenderMode(name="edit_defaults")`[38] annotation supported by the `GenericPortlet` class.

In the deployment descriptor the support for the `edit_defaults` portlet mode must be declared using

```
<portlet-app>
    ...
    <portlet>
           ...
           <supports>
                  ...
                  <portlet-mode> edit_defaults </portlet-mode>
           </supports>
           ...
    </portlet>
    ...
    <custom-portlet-mode>
           <portlet-mode> edit_defaults </portlet-mode>
    </custom-portlet-mode>
    ...
    </portlet-app>
```

The corresponding annotation-based configuration could appear as follows:

```
@PortletConfiguration(portletName="ConfigTestPortlet",
   supports = {
      @Supports(locale="de", portletModes={"edit_defaults"})
   },
   customPortletModes = {
      @CustomPortletMode(name="edit_defaults")
   })
```

D.4 Preview Portlet Mode

The `preview` portlet mode should be used by the portlet to render output without the need of having back-end connections or user specific data available. It may be used at page design time and in portlet development tools.

Portlet developers should implement the `preview` portlet mode functionality by using the `@RenderMode(name="preview")`[38] annotation supported by the `GenericPortlet` class.

In the deployment descriptor the support for the `preview` portlet mode must be declared using

```
<portlet-app>
    ...
    <portlet>
           ...
           <supports>
                  ...
                  <portlet-mode> preview </portlet-mode>
           </supports>
           ...
    </portlet>
    ...
    <custom-portlet-mode>
           <portlet-mode> preview </portlet-mode>
    </custom-portlet-mode>
    ...
    </portlet-app>
```

The corresponding annotation-based configuration could appear as follows:

```
@PortletConfiguration(portletName="ConfigTestPortlet",
   supports = {
      @Supports(locale="de", portletModes={"preview"})
   },
   customPortletModes = {
      @CustomPortletMode(name="preview")
   })
```

D.5 Print Portlet Mode

The `print` portlet mode signifies that the portlet should render a view that can be printed. Portlet developers should implement the `print` portlet mode functionality by using the `@RenderMode(name="print")`[38] annotation supported by the `GenericPortlet` class.

In the deployment descriptor the support for the `print` portlet mode must be declared using

```
<portlet-app>
    ...
    <portlet>
           ...
           <supports>
                  ...
                  <portlet-mode>print</portlet-mode>
           </supports>
           ...
    </portlet>
    ...
    <custom-portlet-mode>
           <portlet-mode>print</portlet-mode>
    </custom-portlet-mode>
    ...
    </portlet-app>
```

The corresponding annotation-based configuration could appear as follows:

```
@PortletConfiguration(portletName="ConfigTestPortlet",
   supports = {
      @Supports(locale="de", portletModes={"print"})
   },
   customPortletModes = {
      @CustomPortletMode(name="print")
   })
```

Appendix E Deployment Descriptor Schema

The Portlet Specification 3.0 deployment descriptor schema is shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema"
        xmlns:portlet="http://xmlns.jcp.org/xml/ns/portlet"
        xmlns:xs="http://www.w3.org/2001/XMLSchema"
        targetNamespace="http://xmlns.jcp.org/xml/ns/portlet"
        elementFormDefault="qualified"
        attributeFormDefault="unqualified"
        version="3.0"
        xml:lang="en">
   <include schemaLocation=""></include>
   <annotation>
      <documentation>
      This is the XML Schema for the Portlet 3.0 deployment descriptor.
      </documentation>
   </annotation>
   <annotation>
      <documentation>
      The following conventions apply to all J2EE
      deployment descriptor elements unless indicated otherwise.
      - In elements that specify a pathname to a file within the
        same JAR file, relative filenames (i.e., those not
        starting with "/") are considered relative to the root of
        the JAR file's namespace.  Absolute filenames (i.e., those
        starting with "/") also specify names in the root of the
        JAR file's namespace.  In general, relative names are
        preferred.  The exception is .war files where absolute
        names are preferred for consistency with the Servlet API.
      </documentation>
   </annotation>
   <!-- ********************************************************** -->
   <import namespace="http://www.w3.org/XML/1998/namespace"
schemaLocation="http://www.w3.org/2001/xml.xsd"/>
   <element name="portlet-app" type="portlet:portlet-appType">
      <annotation>
         <documentation>
         The portlet-app element is the root of the deployment descriptor
         for a portlet application. This element has a required attribute version
         to specify to which version of the schema the deployment descriptor
         conforms. In order to be a valid JSR 362 portlet application the version
         must have the value "3.0".
         </documentation>
      </annotation>
      <unique name="portlet-name-uniqueness">
         <annotation>
            <documentation>
            The portlet element contains the name of a portlet.
            This name must be unique within the portlet application.
             </documentation>
         </annotation>
         <selector xpath="portlet:portlet"/>
         <field xpath="portlet:portlet-name"/>
      </unique>
      <unique name="custom-portlet-mode-uniqueness">
         <annotation>
            <documentation>
            The custom-portlet-mode element contains the portlet-mode.
            This portlet mode must be unique within the portlet application.
            </documentation>
         </annotation>
         <selector xpath="portlet:custom-portlet-mode"/>
         <field xpath="portlet:portlet-mode"/>
      </unique>
      <unique name="custom-window-state-uniqueness">
```

```
            <annotation>
               <documentation>
               The custom-window-state element contains the window-state.
               This window state must be unique within the portlet application.
               </documentation>
            </annotation>
            <selector xpath="portlet:custom-window-state"/>
            <field xpath="portlet:window-state"/>
         </unique>
         <unique name="user-attribute-name-uniqueness">
            <annotation>
               <documentation>
               The user-attribute element contains the name the attribute.
               This name must be unique within the portlet application.
               </documentation>
            </annotation>
            <selector xpath="portlet:user-attribute"/>
            <field xpath="portlet:name"/>
         </unique>
         <unique name="filter-name-uniqueness">
            <annotation>
               <documentation>
               The filter element contains the name of a filter.
               The name must be unique within the portlet application.
               </documentation>
            </annotation>
            <selector xpath="portlet:filter"/>
            <field xpath="portlet:filter-name"/>
         </unique>
      </element>
      <complexType name="portlet-appType">
         <sequence>
            <element name="portlet" type="portlet:portletType" minOccurs="0"
   maxOccurs="unbounded">
               <unique name="init-param-name-uniqueness">
                  <annotation>
                  <documentation>
                  The init-param element contains the name the attribute.
                  This name must be unique within the portlet.
                  </documentation>
                  </annotation>
                  <selector xpath="portlet:init-param"/>
                  <field xpath="portlet:name"/>
               </unique>
               <unique name="supports-mime-type-uniqueness">
                  <annotation>
                  <documentation>
                  The supports element contains the supported mime-type.
                  This mime type must be unique within the portlet.
                  </documentation>
                  </annotation>
                  <selector xpath="portlet:supports"/>
                  <field xpath="mime-type"/>
               </unique>
               <unique name="preference-name-uniqueness">
                  <annotation>
                  <documentation>
                  The preference element contains the name the preference.
                  This name must be unique within the portlet.
                  </documentation>
                  </annotation>
                  <selector xpath="portlet:portlet-preferences/portlet:preference"/>
                  <field xpath="portlet:name"/>
               </unique>
               <unique name="security-role-ref-name-uniqueness">
                  <annotation>
                  <documentation>
                  The security-role-ref element contains the role-name.
                  This role name must be unique within the portlet.
                  </documentation>
                  </annotation>
                  <selector xpath="portlet:security-role-ref"/>
                  <field xpath="portlet:role-name"/>
               </unique>
```

```
            </element>
            <element name="custom-portlet-mode" type="portlet:custom-portlet-modeType"
minOccurs="0" maxOccurs="unbounded"/>
            <element name="custom-window-state" type="portlet:custom-window-stateType"
minOccurs="0" maxOccurs="unbounded"/>
            <element name="user-attribute" type="portlet:user-attributeType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="security-constraint" type="portlet:security-constraintType"
minOccurs="0" maxOccurs="unbounded"/>
            <element name="resource-bundle" type="portlet:resource-bundleType" minOccurs="0"/>
            <element name="filter" type="portlet:filterType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="filter-mapping" type="portlet:filter-mappingType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="default-namespace" type="xs:anyURI" minOccurs="0"/>
            <element name="event-definition" type="portlet:event-definitionType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="public-render-parameter" type="portlet:public-render-parameterType"
minOccurs="0" maxOccurs="unbounded"/>
            <element name="listener" type="portlet:listenerType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="conditional-dispatcher" type="portlet:conditionalDispatcherType"
minOccurs="0" maxOccurs="1"/>
            <element name="container-runtime-option" type="portlet:container-runtime-optionType"
minOccurs="0" maxOccurs="unbounded"/>
         </sequence>
         <attribute name="version" type="portlet:string" use="required"/>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="cache-scopeType">
         <annotation>
            <documentation>
            Caching scope, allowed values are "private" indicating that the content should not
be shared
            across users and "public" indicating that the content may be shared across users.
            The default value if not present is "private".
            Used in: portlet
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
      <complexType name="custom-portlet-modeType">
         <annotation>
            <documentation>
            A custom portlet mode that one or more portlets in
            this portlet application supports.
            If the portal does not need to provide some management functionality
            for this portlet mode, the portal-managed element needs to be set
            to "false", otherwise to "true". Default is "true".
            Used in: portlet-app
            </documentation>
         </annotation>
         <sequence>
            <element name="description" type="portlet:descriptionType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="portlet-mode" type="portlet:portlet-modeType"/>
            <element name="portal-managed" type="portlet:portal-managedType" minOccurs="0"/>
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="custom-window-stateType">
         <annotation>
            <documentation>
            A custom window state that one or more portlets in this
            portlet application supports.
            Used in: portlet-app
            </documentation>
         </annotation>
         <sequence>
            <element name="description" type="portlet:descriptionType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="window-state" type="portlet:window-stateType"/>
```

```
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="expiration-cacheType">
         <annotation>
            <documentation>
            Expiration-time defines the time in seconds after which the portlet output expires.
            -1 indicates that the output never expires.
            Used in: portlet
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="int"/>
         </simpleContent>
      </complexType>
      <complexType name="init-paramType">
         <annotation>
            <documentation>
            The init-param element contains a name/value pair as an
            initialization param of the portlet
            Used in:portlet
            </documentation>
         </annotation>
         <sequence>
            <element name="description" type="portlet:descriptionType" minOccurs="0"
   maxOccurs="unbounded"/>
            <element name="name" type="portlet:nameType"/>
            <element name="value" type="portlet:valueType"/>
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="keywordsType">
         <annotation>
            <documentation>
            Locale specific keywords associated with this portlet.
            The kewords are separated by commas.
            Used in: portlet-info
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
      <complexType name="mime-typeType">
         <annotation>
            <documentation>
            MIME type name, e.g. "text/html".
            The MIME type may also contain the wildcard
            character '*', like "text/*" or "*/*".
            Used in: supports
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
      <complexType name="nameType">
         <annotation>
            <documentation>
            The name element contains the name of a parameter.
            Used in: init-param, ...
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
      <complexType name="resourceNameType">
         <annotation>
            <documentation>
            The resource name element.
            Used in the dependency element.
            </documentation>
         </annotation>
```

```
            <simpleContent>
               <extension base="portlet:string"/>
            </simpleContent>
         </complexType>
         <complexType name="resourceVersionType">
            <annotation>
               <documentation>
               The resource version element.
               Used in the dependency element.
               </documentation>
            </annotation>
            <simpleContent>
               <extension base="portlet:string"/>
            </simpleContent>
         </complexType>
         <complexType name="portletType">
            <annotation>
               <documentation>
               The portlet element contains the declarative data of a portlet.
               Used in: portlet-app
               </documentation>
            </annotation>
            <sequence>
               <element name="description" type="portlet:descriptionType" minOccurs="0"
maxOccurs="unbounded"/>
               <element name="portlet-name" type="portlet:portlet-nameType"/>
               <element name="display-name" type="portlet:display-nameType" minOccurs="0"
maxOccurs="unbounded"/>
               <element name="portlet-class" type="portlet:portlet-classType"/>
               <element name="init-param" type="portlet:init-paramType" minOccurs="0"
maxOccurs="unbounded"/>
               <element name="expiration-cache" type="portlet:expiration-cacheType" minOccurs="0"/>
               <element name="cache-scope" type="portlet:cache-scopeType" minOccurs="0"/>
               <element name="supports" type="portlet:supportsType" maxOccurs="unbounded"/>
               <element name="supported-locale" type="portlet:supported-localeType" minOccurs="0"
maxOccurs="unbounded"/>
               <element name="resource-bundle" type="portlet:resource-bundleType" minOccurs="0"/>
               <element name="portlet-info" type="portlet:portlet-infoType" minOccurs="0"/>
               <element name="portlet-preferences" type="portlet:portlet-preferencesType"
minOccurs="0"/>
                     <element name="conditional-dispatcher"
type="portlet:conditionalDispatcherType" minOccurs="0" maxOccurs="1"/>
               <element name="security-role-ref" type="portlet:security-role-refType" minOccurs="0"
maxOccurs="unbounded"/>
               <element name="supported-processing-event" type="portlet:event-definition-
referenceType" minOccurs="0" maxOccurs="unbounded"/>
               <element name="supported-publishing-event" type="portlet:event-definition-
referenceType" minOccurs="0" maxOccurs="unbounded"/>
               <element name="supported-public-render-parameter" type="portlet:string"
minOccurs="0" maxOccurs="unbounded"/>
               <element name="container-runtime-option" type="portlet:container-runtime-optionType"
minOccurs="0" maxOccurs="unbounded"/>
               <element name="dependency" type="portlet:dependencyType" minOccurs="0"
maxOccurs="unbounded"/>
            </sequence>
            <attribute name="id" type="portlet:string" use="optional"/>
         </complexType>
         <simpleType name="portlet-classType">
            <annotation>
               <documentation>
                The portlet-class element contains the fully
                qualified class name of the portlet.
               Used in: portlet
               </documentation>
            </annotation>
            <restriction base="portlet:fully-qualified-classType"/>
         </simpleType>
         <complexType name="container-runtime-optionType">
            <annotation>
               <documentation>
                The container-runtime-option element contains settings
                for the portlet container that the portlet expects to be honored
                at runtime. These settings may re-define default portlet container
                behavior, like the javax.portlet.escapeXml setting that disables
```

```
               XML encoding of URLs produced by the portlet tag library as
               default.
               Names with the javax.portlet prefix are reserved for the Java
               Portlet Specification.
            Used in: portlet-app, portlet
            </documentation>
         </annotation>
         <sequence>
            <element name="name" type="portlet:nameType"/>
            <element name="value" type="portlet:valueType" minOccurs="0" maxOccurs="unbounded"/>
         </sequence>
      </complexType>
      <complexType name="filter-mappingType">
         <annotation>
            <documentation>
            Declaration of the filter mappings in this portlet
            application is done by using filter-mappingType.
            The container uses the filter-mapping
            declarations to decide which filters to apply to a request,
            and in what order. To determine which filters to
            apply it matches filter-mapping declarations on the
            portlet-name and the lifecyle phase defined in the
            filter element. The order in which filters are invoked
            is the order in which filter-mapping declarations
            that match appear in the list of filter-mapping elements.
            Used in: portlet-app
            </documentation>
         </annotation>
         <sequence>
            <element name="filter-name" type="portlet:filter-nameType"/>
            <element name="portlet-name" type="portlet:portlet-nameType" maxOccurs="unbounded"/>
         </sequence>
      </complexType>
      <complexType name="filterType">
         <annotation>
            <documentation>
               The filter element specifies a filter that can transform the
               content of portlet requests and portlet responses.
               Filters can access the initialization parameters declared in
               the deployment descriptor at runtime via the FilterConfig
               interface.
               A filter can be restricted to one or more lifecycle phases
               of the portlet. Valid entries for lifecycle are:
               ACTION_PHASE, EVENT_PHASE, RENDER_PHASE,
               RESOURCE_PHASE
               Used in: portlet-app
               </documentation>
         </annotation>
         <sequence>
            <element name="description" type="portlet:descriptionType" minOccurs="0"
   maxOccurs="unbounded"/>
            <element name="display-name" type="portlet:display-nameType" minOccurs="0"
   maxOccurs="unbounded"/>
            <element name="filter-name" type="portlet:filter-nameType"/>
            <element name="filter-class" type="portlet:fully-qualified-classType"/>
            <element name="lifecycle" type="portlet:string" maxOccurs="unbounded"/>
            <element name="init-param" type="portlet:init-paramType" minOccurs="0"
   maxOccurs="unbounded"/>
         </sequence>
      </complexType>
   """""""" <complexType name="event-definitionType">
         <annotation>
            <documentation>
            The event-definitionType is used to declare events the portlet can either
            receive or emit.
            The name must be unique and must be the one the
            portlet is using in its code for referencing this event.
            Used in: portlet-app
            </documentation>
         </annotation>
         <sequence>
            <element name="description" type="portlet:descriptionType" minOccurs="0"
   maxOccurs="unbounded"/>
```

```
            <element name="display-name" type="portlet:display-nameType" minOccurs="0"
maxOccurs="unbounded"/>                        <choice>
               <element name="qname" type="xs:QName"/>
               <element name="name" type="xs:NCName"/>
            </choice>
            <element name="alias" type="xs:QName" minOccurs="0" maxOccurs="unbounded"/>
            <element name="value-type" type="portlet:fully-qualified-classType" minOccurs="0"/>
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="event-definition-referenceType">
         <annotation>
            <documentation>
            The event-definition-referenceType is used to reference events
            declared with the event-definition element at application level.
            Used in: portlet
            </documentation>
         </annotation>
         <choice>
            <element name="qname" type="xs:QName"/>
            <element name="name" type="xs:NCName"/>
         </choice>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="conditionalDispatcherType">
         <annotation>
            <documentation>
            The conditionalDispatcherType is used to declare conditional dispatchers for this
portlet or portlet application.
            Used in: portlet, portlet-app
            </documentation>
         </annotation>
         <sequence>
            <element name="description" type="portlet:descriptionType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="display-name" type="portlet:display-nameType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="dispatcher-class" type="portlet:fully-qualified-classType"/>
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="listenerType">
         <annotation>
            <documentation>
            The listenerType is used to declare listeners for this portlet application.
            Used in: portlet-app
            </documentation>
         </annotation>
         <sequence>
            <element name="description" type="portlet:descriptionType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="display-name" type="portlet:display-nameType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="listener-class" type="portlet:fully-qualified-classType"/>
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="portlet-infoType">
         <sequence>
            <element name="title" type="portlet:titleType" minOccurs="0"/>
            <element name="short-title" type="portlet:short-titleType" minOccurs="0"/>
            <element name="keywords" type="portlet:keywordsType" minOccurs="0"/>
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <simpleType name="portal-managedType">
         <annotation>
            <documentation>
            portal-managed indicates if a custom portlet mode
            needs to be managed by the portal or not.
            Per default all custom portlet modes are portal managed.
            Valid values are:
            - true for portal-managed
            - false for not portal managed
```

```
            Used in: custom-portlet-modes
            </documentation>
         </annotation>
         <restriction base="portlet:string">
            <enumeration value="true"/>
            <enumeration value="false"/>
         </restriction>
      </simpleType>
      <complexType name="portlet-modeType">
         <annotation>
            <documentation>
            Portlet modes. The specification pre-defines the following values
            as valid portlet mode constants:
            "edit", "help", "view".
            Portlet mode names are not case sensitive.
            Used in: custom-portlet-mode, supports
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
      <complexType name="portlet-nameType">
         <annotation>
            <documentation>
            The portlet-name element contains the canonical name of the
            portlet. Each portlet name is unique within the portlet
            application.
            Used in: portlet, filter-mapping
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
      <complexType name="portlet-preferencesType">
         <annotation>
            <documentation>
            Portlet persistent preference store.
            Used in: portlet
            </documentation>
         </annotation>
         <sequence>
            <element name="preference" type="portlet:preferenceType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="preferences-validator" type="portlet:preferences-validatorType"
minOccurs="0"/>
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="preferenceType">
         <annotation>
            <documentation>
            Persistent preference values that may be used for customization
            and personalization by the portlet.
            Used in: portlet-preferences
            </documentation>
         </annotation>
         <sequence>
            <element name="name" type="portlet:nameType"/>
            <element name="value" type="portlet:valueType" minOccurs="0" maxOccurs="unbounded"/>
            <element name="read-only" type="portlet:read-onlyType" minOccurs="0"/>
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <simpleType name="preferences-validatorType">
         <annotation>
            <documentation>
            The class specified under preferences-validator implements
            the PreferencesValidator interface to validate the
            preferences settings.
            Used in: portlet-preferences
            </documentation>
         </annotation>
```

```
            <restriction base="portlet:fully-qualified-classType"/>
         </simpleType>
         <simpleType name="read-onlyType">
            <annotation>
               <documentation>
               read-only indicates that a setting cannot
               be changed in any of the standard portlet modes
               ("view","edit" or "help").
               Per default all preferences are modifiable.
               Valid values are:
               - true for read-only
               - false for modifiable
               Used in: preferences
               </documentation>
            </annotation>
            <restriction base="portlet:string">
               <enumeration value="true"/>
               <enumeration value="false"/>
            </restriction>
         </simpleType>
         <complexType name="resource-bundleType">
            <annotation>
               <documentation>
               Name of the resource bundle containing the language specific
               portlet informations in different languages (Filename without
               the language specific part (e.g. _en) and the ending (.properties).
               Used in: portlet-info
               </documentation>
            </annotation>
            <simpleContent>
               <extension base="portlet:string"/>
            </simpleContent>
         </complexType>
         <complexType name="role-linkType">
            <annotation>
               <documentation>
               The role-link element is a reference to a defined security role.
               The role-link element must contain the name of one of the
               security roles defined in the security-role elements.
               Used in: security-role-ref
               </documentation>
            </annotation>
            <simpleContent>
               <extension base="portlet:string"/>
            </simpleContent>
         </complexType>
"""""""""""""""""""""""""      <complexType name="security-role-refType">
            <annotation>
               <documentation>
               The security-role-ref element contains the declaration of a
               security role reference in the code of the web application. The
               declaration consists of an optional description, the security
               role name used in the code, and an optional link to a security
               role. If the security role is not specified, the Deployer must
               choose an appropriate security role.
               The value of the role name element must be the String used
               as the parameter to the
               EJBContext.isCallerInRole(String roleName) method
               or the HttpServletRequest.isUserInRole(String role) method.
               Used in: portlet
               </documentation>
            </annotation>
            <sequence>
               <element name="description" type="portlet:descriptionType" minOccurs="0"
maxOccurs="unbounded"/>
               <element name="role-name" type="portlet:role-nameType"/>
               <element name="role-link" type="portlet:role-linkType" minOccurs="0"/>
            </sequence>
            <attribute name="id" type="portlet:string" use="optional"/>
         </complexType>
         <complexType name="public-render-parameterType">
            <annotation>
               <documentation>
               The public-render-parameters defines a render parameter that is allowed to be public
```

```
            and thus be shared with other portlets.
            The identifier must be used for referencing this public render parameter in the
portlet code.
            Used in: portlet-app
            </documentation>
         </annotation>
         <sequence>
            <element name="description" type="portlet:descriptionType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="display-name" type="portlet:display-nameType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="identifier" type="portlet:string"/>
            <choice>
               <element name="qname" type="xs:QName"/>
               <element name="name" type="xs:NCName"/>
            </choice>
"""""""""     </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="short-titleType">
         <annotation>
            <documentation>
            Locale specific short version of the static title.
            Used in: portlet-info
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
      <complexType name="supportsType">
         <annotation>
            <documentation>
            Supports indicates the portlet modes a
            portlet supports for a specific content type. All portlets must
            support the view mode.
            Used in: portlet
            </documentation>
         </annotation>
         <sequence>
            <element name="mime-type" type="portlet:mime-typeType"/>
            <element name="portlet-mode" type="portlet:portlet-modeType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="window-state" type="portlet:window-stateType" minOccurs="0"
maxOccurs="unbounded"/>
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
      <complexType name="dependencyType">
         <annotation>
            <documentation>
            Dependency specifies a resource on which the portlet depends.
            </documentation>
         </annotation>
         <sequence>
            <element name="name" type="portlet:resourceNameType"/>
            <element name="min-version" type="portlet:resourceVersionType"/>
         </sequence>
      </complexType>
      <complexType name="supported-localeType">
         <annotation>
            <documentation>
            Indicated the locales the portlet supports.
            Used in: portlet
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
      <complexType name="titleType">
         <annotation>
            <documentation>
            Locale specific static title for this portlet.
```

```
            Used in: portlet-info
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
""""""""""  <complexType name="user-attributeType">
         <annotation>
            <documentation>
            User attribute defines a user specific attribute that the
            portlet application needs. The portlet within this application
            can access this attribute via the request parameter USER_INFO
            map.
            Used in: portlet-app
            </documentation>
         </annotation>
         <sequence>
            <element name="description" type="portlet:descriptionType" minOccurs="0"
maxOccurs="unbounded"/>
            <element name="name" type="portlet:nameType"/>
         </sequence>
         <attribute name="id" type="portlet:string" use="optional"/>
      </complexType>
""""""""""""""""""""  <complexType name="valueType">
         <annotation>
            <documentation>
            The value element contains the value of a parameter.
            Used in: init-param
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
      <complexType name="window-stateType">
         <annotation>
            <documentation>
            Portlet window state. Window state names are not case sensitive.
            Used in: custom-window-state
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string"/>
         </simpleContent>
      </complexType>
      <!--- everything below is copied from j2ee_1_4.xsd -->
      <complexType name="descriptionType">
         <annotation>
            <documentation>
            The description element is used to provide text describing the
            parent element. The description element should include any
            information that the portlet application war file producer wants
            to provide to the consumer of the portlet application war file
            (i.e., to the Deployer). Typically, the tools used by the
            portlet application war file consumer will display the
            description when processing the parent element that contains the
            description. It has an optional attribute xml:lang to indicate
            which language is used in the description according to
            RFC 1766 (http://www.ietf.org/rfc/rfc1766.txt). The default
            value of this attribute is English("en").
            Used in: init-param, portlet, portlet-app, security-role
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string">
               <attribute ref="xml:lang"/>
            </extension>
         </simpleContent>
      </complexType>
      <complexType name="display-nameType">
         <annotation>
            <documentation>
            The display-name type contains a short name that is intended
```

```
            to be displayed by tools. It is used by display-name
            elements.  The display name need not be unique.
            Example:
               ...
            <display-name xml:lang="en">Employee Self Service</display-name>

            It has an optional attribute xml:lang to indicate
            which language is used in the description according to
            RFC 1766 (http://www.ietf.org/rfc/rfc1766.txt). The default
            value of this attribute is English("en").
            </documentation>
         </annotation>
         <simpleContent>
            <extension base="portlet:string">
               <attribute ref="xml:lang"/>
            </extension>
         </simpleContent>
      </complexType>
      <simpleType name="fully-qualified-classType">
         <annotation>
            <documentation>
            The elements that use this type designate the name of a
            Java class or interface.
            </documentation>
         </annotation>
         <restriction base="portlet:string"/>
      </simpleType>
      <simpleType name="role-nameType">
         <annotation>
            <documentation>
            The role-nameType designates the name of a security role.

            The name must conform to the lexical rules for an NMTOKEN.
            </documentation>
         </annotation>
         <restriction base="NMTOKEN"/>
      </simpleType>
      <simpleType name="string">
         <annotation>
            <documentation>
            This is a special string datatype that is defined by JavaEE
            as a base type for defining collapsed strings. When
            schemas require trailing/leading space elimination as
            well as collapsing the existing whitespace, this base
            type may be used.
            </documentation>
         </annotation>
         <restriction base="string">
            <whiteSpace value="collapse"/>
         </restriction>
      </simpleType>
      <simpleType name="filter-nameType">
         <annotation>
            <documentation>
            The logical name of the filter is declare
            by using filter-nameType. This name is used to map the
            filter.  Each filter name is unique within the portlet
            application.
            Used in: filter, filter-mapping
            </documentation>A
         </annotation>
         <restriction base="portlet:string"/>
      </simpleType>
   </schema>
```