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Portlets (JSR-168)

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Agenda

- Introduction
  - Concepts – Portals, Portlets, WebApps
- The Basics
  - API, Modes, States, Lifecycle of a Portlet
- More Detail
  - Names, URLs, Preferences, *etc*.
- Portlets and Servlets and JSPs
- Other Topics
- Examples

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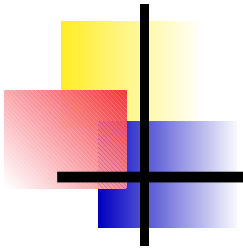

Introduction

Portals, Portlets, and all that

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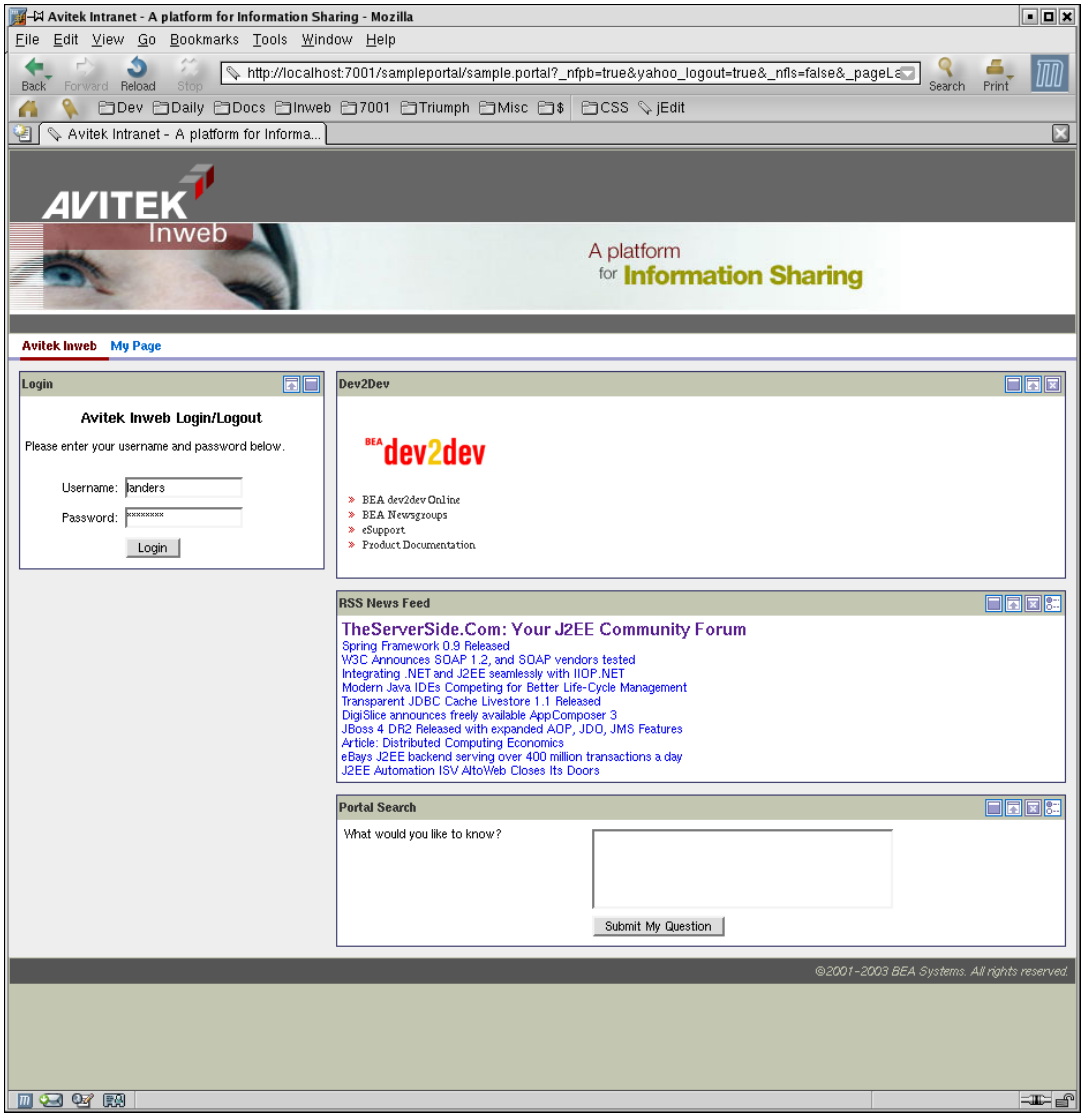
What Is a Portal?

- Portal is a Web Page
  - Hosted by a WebApp
  - Aggregation of Content
    - Portlets
    - And other things
      - ✔ Header
      - ✔ Footer
      - ✔ Menus
      - ✔ Links
- There is no Portal spec



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What Is a Portlet?

- Content for a Portal
- Mini-Application
- Portlets are assembled into a full Web page by the Portal
  - Portlets are just fragments of markup (HTML)
    - Avoid HEAD, TITLE, BODY, FRAME, *etc*.

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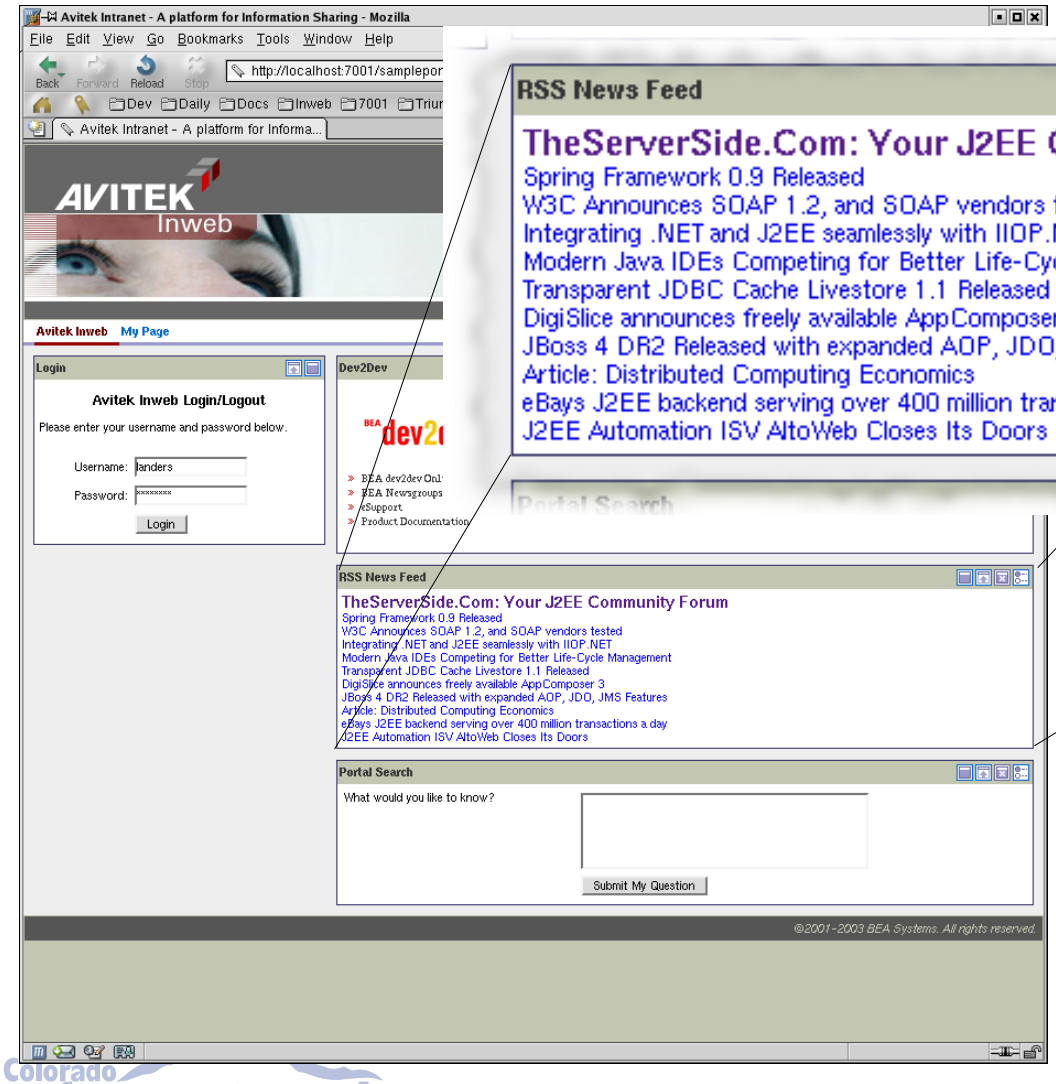
Portal Page Elements



Decorations and Controls

Portlet Window

Portlet Content (Fragment)

Portal Page

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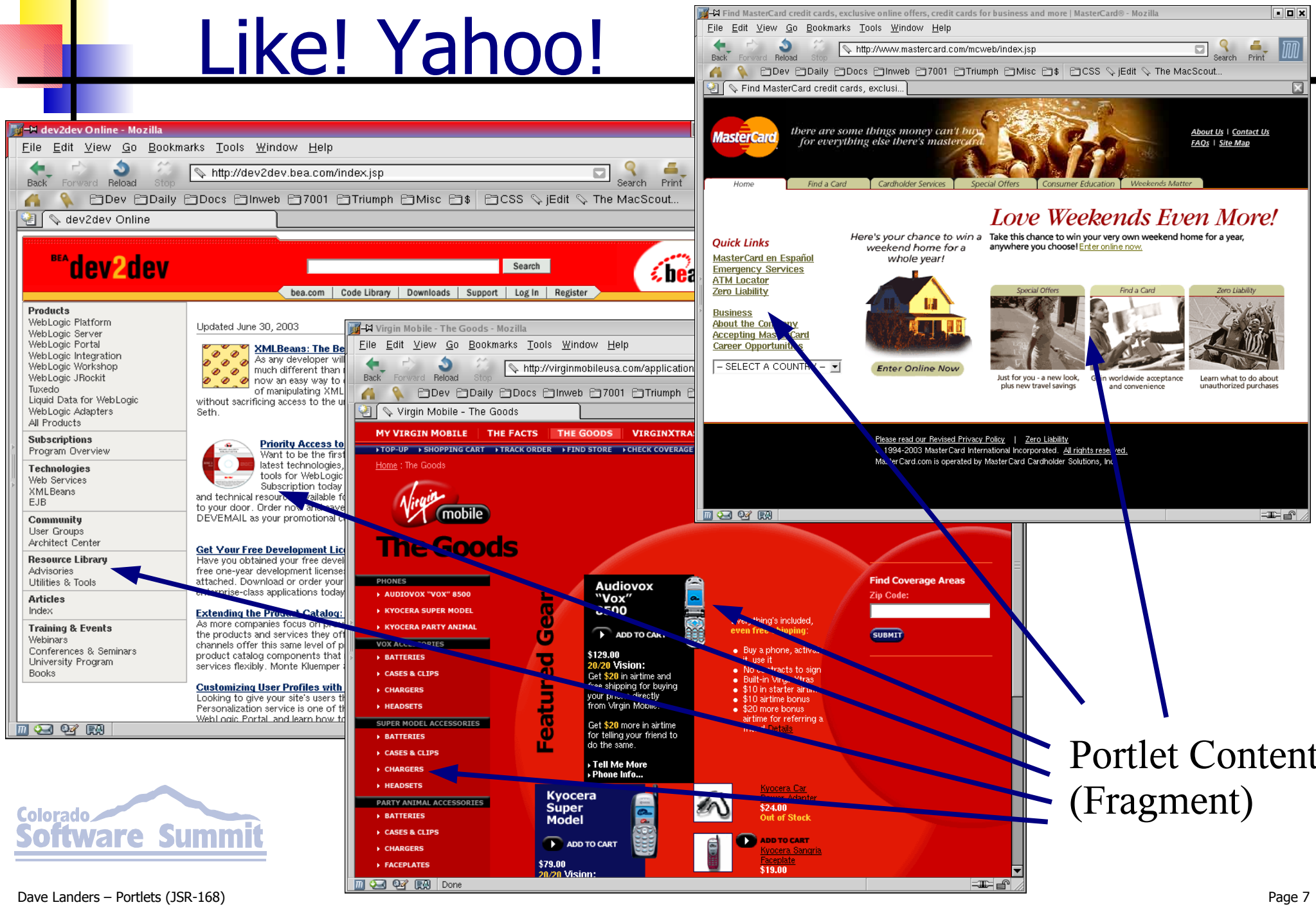
Portals! Don't! Have! To! Look! Like! Yahoo!



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Portal Applications and WebApps

- Portal Application is part of a WebApp
  - Portal is hosted by WebApp
  - WebApp can also have "normal" Servlets and JSPs
  - Portlets deployed like Servlets
    - In WEB-INF/classes or WEB-INF/lib
    - Deployment Descriptor WEB-INF/portlet.xml
- Portlets can use Servlets and JSPs
  - To generate markup fragments or perform tasks
- Portlets have access to other Servlet container services
  - And J2EE services if WebApp in J2EE container

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The Basics

Window States, Portlet Modes, Lifecycle, API

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Portlet Window States

- How the Portlet is rendered in the Portal
  - NORMAL
    - Normal – what else to say?

  - MINIMIZED
    - Portlet content is not rendered
    - Portal may still draw Portlet's decorations
  - MAXIMIZED
    - Portlet has the whole Portal page (or a large portion of it)
  - Custom States
    - Declared by Portlet, only used if supported by Portal
    - Example: HALF_PAGE, NARROW, FLOATING, WIDE ...

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Portlet Modes

- What kind of function the Portlet is performing
  - VIEW
    - The normal mode – show your stuff

  - EDIT
    - Changing preferences or properties – usually forms
  - HELP
    - Should be useful or informative...
  - Custom Modes
    - Declared by Portlet, only used if supported by Portal
    - " Standard" custom modes suggested by spec:
      - ✓ ABOUT, CONFIG, EDIT_DEFAULTS, PREVIEW, PRINT

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The Portlet API – javax.portlet

- Portlet
  - processAction(ActionRequest, ActionResponse)
    - The "action" phase (respond to action events)
  - render(RenderRequest, RenderResponse)
    - The "render" phase (generate markup)
- GenericPortlet
  - render() forwards to mode-specific methods
    - doView()
    - doEdit()
    - doHelp()
    - doDispatch() can add processing for custom modes

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Portlet Request Lifecycle

- On any HTTP request, the Portal will invoke...
  - processAction()
    - For zero or one Portlet
    - Only if request is an Action URL and "Targeted" to the Portlet
  - render()
    - For all Portlets it decides should be rendered
    - No guarantees of order, *etc*.
    - Might run concurrently in separate Threads
    - Might run distributed on different VMs
    - Portlet returns content fragment
- Portal assembles fragments into a web page

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Lifecycle Implications

- Change things only in the processAction method
  - Preferences
  - Modes, State
  - Session Attributes
  - Changes will take effect for that Portlet's render phase
  - Can pass parameters to render via ActionResponse
  - Do not render any content from processAction
- Render should just construct HTML
  - Can build forms, links using Action URLs
    - Action URL targets the request back to processAction

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Other javax.portlet APIs

- Mostly, these match their counterparts in Servlet
  - PortletRequest, PortletResponse
    - ActionRequest, ActionResponse
    - RenderRequest, RenderResponse
  - PortletConfig
  - PortletContext
  - PortletSession
  - PortletRequestDispatcher
  - PortletPreferences

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Code Break

- HelloWorld Portlet
  - Unavoidable…

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More Detail

URLs, Names, Preferences, Session

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Links in a Portlet

- Portlet can't generate "normal" URLs to itself
  - Normal links to external pages are OK
    - Leave the Portal or target new window
- Links to a Portlet are special
    - Links to content
    - FORM actions
  - " Targeted" to the Portlet
    - Portal still has to render other Portlets
    - Portal might need to mangle the URL
  - Two types of URLs
    - Action – like processing FORM submit – runs processAction()
    - Render – displays content

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Portlet URLs

- Action URL
  - renderResponse.createActionURL()
  - Causes the targeted Portlet's processAction method to be run before rendering any Portlets
- Render URL
  - renderResponse.createRenderURL()
  - Causes the Portlet to be rendered
  - Does not invoke processAction
- Can pass parameters, change window state, change modes...
  - Parameters only go to the targeted Portlet

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Namespace Encoding

- Portlets generate HTML markup that must live on the same page with other HTML markup
- Requires names and identifiers to be name-spaced
  - So they are unique to the Portlet
  - Avoid collisions
  - HTML id's
  - Javascript variables and functions
- Prefix with getNamespace()
  - renderResponse.getNamespace() + "ident"

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Forms in a Portlet

- Forms should use POST
  - Don't use GET method
    - Portal may encode state information in query string
  - Use POST with ActionURL and parameters
    - Encode any ids and javascript

```
PortletURL url = portletResponse.createActionURL();
url.addParameter("searchUsing", "google");
url.setWindowState( WindowState.MAXIMIZED );
url.setPortletMode( PortletMode.VIEW );
writer.print( "<FORM METHOD=\"POST\" ACTION=\""
  + url.toString() + "\" >" );
writer.print( "<INPUT TYPE=\"TEXT\" NAME=\"keywords\">" );
writer.print( "</FORM>" );
```

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Portlet Preferences

- Configuration for a Portlet instance
  - Persistent customization of a Portlet's view or behavior
  - Declared in deployment descriptor (portlet.xml)
    - Specific to Portlet instance
    - Allows deploying multiple instances of the same Portlet with different preferences
    - Example:
      - ✔ News Feed Portlet
      - ✔ News Stream RSS URL as a Preference
      - ✔ Deployed 3 times – for Slashdot, BBC, and TheServerSide
- NOTE Preferences are Configuration Data
  - NOT a substitute for a Database

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Portlet User Preferences

- Preferences are also scoped to the User
  - For example, in News Feed Portlet
    - EDIT page could allow user to change
      - The RSS URL
      - Max number of news items
- No distinction made in API to determine:
  - Portlet-container supplied Preference defaults
  - Preferences from deployment descriptor
  - Preferences supplied by Portal
  - User-specific Preferences

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Using Preferences

- Retrieve PortletPreferences object from PortletRequest

```
PortletPreferences prefs =
  portletRequest.getPreferences();
```

- Get values

```
String[] stocks = prefs.getValues(
  "stockSymbols",
  new String[] { "BEAS", "SUNW", "IBM" } );
```

- Get attribute names or Map of name/value pairs

```
Enumeration getNames()
Map getMap()
```

- Can use Preferences in any Portlet method, Mode, State

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Preferences are String Arrays

```
String[] getValues(String name, String[] default)
void setValues(String name, String[] vals)
```

- It is up to the developer (you) to ensure:
  - Manage multi- *vs*. single- valued data
  - Conversions to appropriate types (int, date, *etc*.)
    - PreferencesValidator can help
- Convenience getValue / setValue methods for single-valued data
  - getValue() returns getValues()[0]
  - setValue(val) is setValues(new String[] { val })

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Modifying Preferences

- Preferences may be modified only during processAction() method
- Methods:
  - boolean isReadOnly(String name)
  - void setValue(String name, String val)
  - void setValues(String name, String[] vals)
  - reset(String name)
    - Restore attribute to default value
      - Up to the vendor to determine the default
        - Probably in deployment descriptor
      - Delete the attribute if no default available

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Persisting Preference Changes

- Nothing is persisted until you call store()
  - Atomic persistence of all changes
  - May throw exception if store is not possible
    - For example, no user is logged in
    - No good way to pre-determine chance of success
    - No consistent way to determine reason for failure
- If store() is not called, changes are discarded on return from processAction()

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HTTP Session Attributes

- Portlets can access the HTTP Session
  - PortletSession is mirror of HttpSession
  - Uses one of two scope identifiers
    - PORTLET_SCOPE
      - This is the default
      - Attributes names are are name-spaced to the individual Portlet instance
        - javax.portlet.p.<ID>?<ATTRIBUTE_NAME>
        - PortletSessionUtils for access from a Servlet
    - APPLICATION_SCOPE
      - Attributes in the normal HTTP session without name mangling
      - Can communicate between Portlets or Servlets
  - Should only change Session from processAction()

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Code Break

- Picture Portlet
  - Display picture specified by Preference
  - EDIT mode to change preference
    - FORM

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Portlets, Servlets, and JSPs

Dispatching Requests

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Servlets and JSPs

- Portlet can include Servlets, JSPs, other pages
- Allows Portlet to
  - Externalize presentation markup
  - Reuse existing JSP pages and Servlets
- Restrictions
  - Must output markup fragments
  - No access to some HTTP Request/Response data
    - Protocol, RemoteAddr, RemoteHost, RealPath, RequestURL
    - CharacterEncoding, ContentType, ContentLength, *etc*.
    - InputStream, Reader
    - Cookies, Response Header, *etc*.

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PortletRequestDispatcher

- From render() method:

```
String path = "/cart.jsp?orderid="
              + orderId;

PortletRequestDispatcher rd =
  context.getRequestDispatcher(path);

rd.include(renderRequest, renderResponse);
```

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Included Servlets and JSPs

- Can access Portlet objects
  - Request Attributes set by PortletRequestDispatcher
    - javax.portlet.config – the PortletConfig
    - javax.portlet.request – the RenderRequest
    - javax.portlet.response – the RenderResponse
- Share Session data
  - APPLICATION_SCOPE
  - Use PortletSessionUtils to encode PORTLET_SCOPE attribute names

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Portlet Tags for Included JSPs

- <portlet:defineObjects/>
  - Creates variables for
    - renderRequest
    - renderResponse
    - portletConfig
- <portlet:actionURL ... />
  <portlet:renderURL .../>
  - Creates action and render URLs
  - <portlet:param .../> sub-tag for request parameters
- <portlet:namespace/>
  - For namespacing identifiers in Forms, JavaScript, *etc*.

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JSP Portlet Pattern

- Portlet class contains performAction()
  - Process forms, other actions
  - Modify Preferences and Session data
  - Maintain state for multi-page forms
- Render method dispatch to JSPs
  - For presentation markup
  - But JSP probably not generally reusable
    - JSP must only generate fragments
    - JSP probably strongly tied to a Portlet or set of Portlets
  - JSP is hosted by WebApp, accessible from outside
    - Rely on unpublished URLs to hide it

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Code Break

- Picture Portlet with rendering externalized to JSP
  - Separate JSP page for VIEW and EDIT modes
  - SimpleJspPortlet base class does render dispatch

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Other Topics

Content Types, Resource Bundles, Security, WSRP, *etc*.

... nearing the end.

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Content Type

- Content Type is the type of data served by a request
  - text/html, text/plain, text/vnd.wap.wml, *etc*.
- Unlike a Servlet or JSP, a Portlet does not get to decide its own content type
  - Decided by the Portal which contains it
- Must declare which Content Type(s) it supports
- Must query portal for which types are allowed for a particular request
- Portlet should render content of that type

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Internationalization / Localization

- Portlet can declare a ResourceBundle
  - In Deployment Descriptor (portlet.xml)
- ResourceBundle is used to override portlet-info elements in Deployment Descriptor
  - title, short-title, keywords
  - Used in Portlet's title bar and for searching, *etc*.
- Portlet can also access resources from the bundle
  - Using PortletConfig.getResourceBundle()
- Preferences can also be localized in the ResourceBundle

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Portlet Security

- Programatic security APIs like Servlet
  - getRemoteUser, getUserPrincipal, isUserInRole
  - Role mapping in portlet.xml descriptor
- Declarative security for Transport (SSL)
  - NONE, INTEGRAL, CONFIDENTIAL
  - No definition of how Portal handles INTEGRAL or CONFIDENTIAL Portlet with http: request
- No Declarative Security for Portlet Authorization
  - Portlet needs to decide how it acts
    - Display Nothing? Default Content? "Please Login"?
    - Error? Login dialog? Something Else?

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Portlet Caching

- Portlet Container may provide Caching for rendered content fragments
  - It is optional
  - Cache is per-Portlet and per-User
- Portlets declare that they want caching
  - Set expiration-cache element in portlet.xml
    - Time in seconds
    - Can override cache time in RenderResponse
- Cache is discarded when a Portlet URL targets the Portlet explicitly
    - actionURL or renderURL

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WSRP

- Web Services for Remote Portlets
- OASIS spec
- Related to, but not part of, JSR-168
- Allow Portal to aggregate Portlets from other servers

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Summary

- Portlet Spec closely related to Servlet
  - Portal App runs in a WebApp
  - Many similar concepts
  - New Programming model
    - Since Portlet must coexist with other Portlets
      - Names, URLs, Actions, *etc*.
- Portlets generate Fragments, not Pages
- Standard Portlets should be portable across Portal vendors

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Web References

- Portlet Spec
  - http://jcp.org/en/jsr/detail?id=168
- Pluto
  - Portlet Reference Implementation
  - http://jakarta.apache.org/pluto
- Servlets
  - http://java.sun.com/products/servlet
- WSRP
  - http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=wsrp

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The End – Thank You

- Please fill out evaluations

- Example Code
  - On the conference CDROM
  - http://www.avitek.com/landers

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