



GridSphere: A Portal Framework

Jason Novotny novotny@aei.mpg.de

Michael Russell russell@aei.mpg.de

Oliver Wehrens wehrens@aei.mpg.de

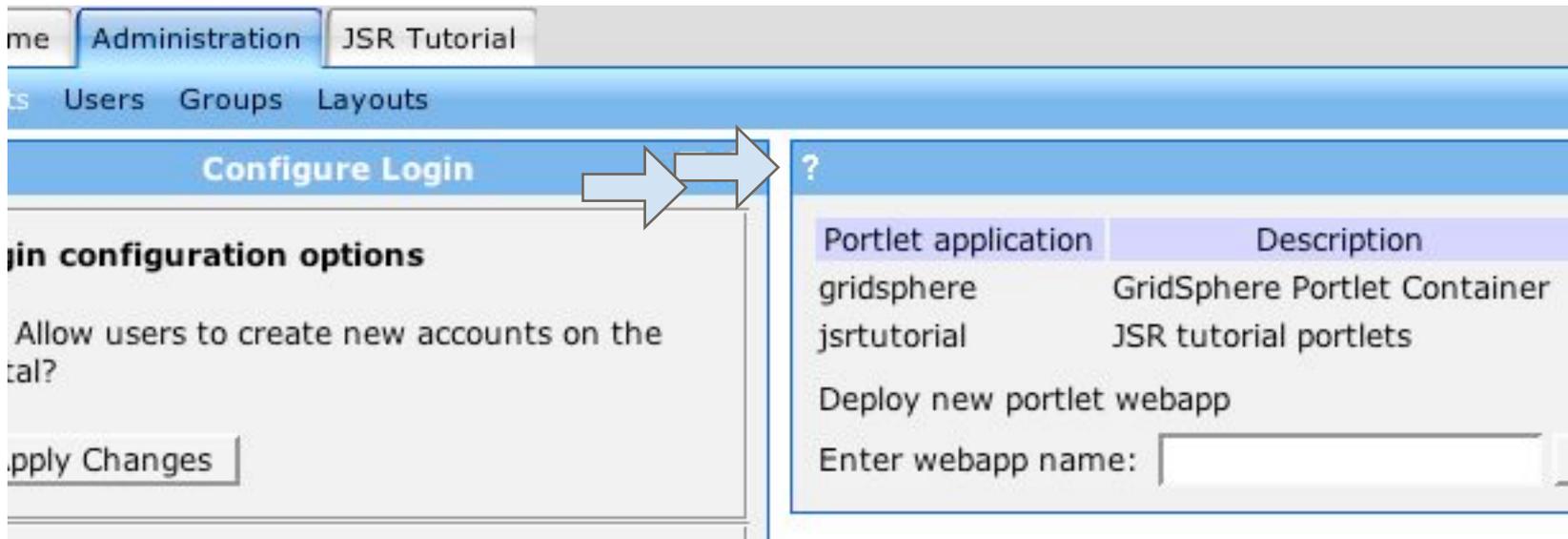
Albert Einstein Institute

- Web based portals provide a customizable user environment.
- Portals act as a gateway between users and services
- Portal standards have evolved to enable separation of business functions from application server
- Portlets are the driving concept to deliver reusable web functionality



The screenshot shows the Yahoo! homepage interface. At the top, there are navigation icons for My, Finance, Shop, Email, Messenger, and HotJobs. The main header features the 'YAHOO!' logo and a search bar with options for 'advanced search' and 'most popular'. Below the search bar, there are several sections: 'New!' with a link to 'See What Celebs Are Buying This Holiday Season', 'Shop' with links to 'Auctions, Autos, Classifieds, Real Estate, Shopping, Travel', 'Find' with links to 'Careers, Maps, People Search, Personals, Yellow Pages', 'Connect' with links to 'Chat, GeoCities, Greetings, Groups, Mail, Messenger, Mobile', 'Organize' with links to 'Addresses, Briefcase, Calendar, My Yahoo!, PayDirect, Photos', 'Fun' with links to 'Games, Horoscopes, Kids, Movies, Music, TV', and 'Info' with links to 'Finance, Health, News, Sports, Weather' and 'More Yahoo!...'. A 'Yahoo! Shopping' section highlights 'Holiday Gift Ideas' and features a 'Sony's Smallest Digital Camera' for \$199. A 'Web Site Directory' section lists various categories like Business & Economy, Computers & Internet, News & Media, Entertainment, Recreation & Sports, Regional, Society & Culture, Education, Arts & Humanities, and Science. On the right side, there is a 'Web Hosting from Yahoo!' advertisement, a 'Personal Assistant' section with a 'Sign In' button, and an 'In The News' section with a list of news items and market updates.

- JSR 168 Portlet API ratified August 2003
 - Similar to Servlet API in providing reusable web applications
 - Ratified by vendors including BEA, Sun, IBM, Oracle, Plumtree and others...
- WSRP (Web Services for Remote Portlets) ratified by OASIS committee
 - Specifies how web services can be consumed by standards compliant portals
- Java Server Faces ratified
 - Specifies an event based user interface for web presentation development



The screenshot shows a web portal administration interface. At the top, there are tabs for 'Administration' and 'JSR Tutorial'. Below the tabs, there are links for 'Users', 'Groups', and 'Layouts'. The main content area is divided into two panes. The left pane is titled 'Configure Login' and contains 'Login configuration options' with a checkbox for 'Allow users to create new accounts on the portal?' and an 'Apply Changes' button. The right pane is titled '?' and contains a table of portlet applications. The table has two columns: 'Portlet application' and 'Description'. The table lists two applications: 'gridsphere' (GridSphere Portlet Container) and 'jsrtutorial' (JSR tutorial portlets). Below the table, there is a section for 'Deploy new portlet webapp' with an input field for 'Enter webapp name:'.

Portlet application	Description
gridsphere	GridSphere Portlet Container
jsrtutorial	JSR tutorial portlets

- Standardized packaging model makes it easier to share portlet applications among portal vendors.
- Supports window states and mode settings like desktop environment



Portlet Implementations



- Current vendors offer compliant portals or fix-it packs...
 - IBM WebSphere
 - Oracle 10g Portal
 - Sun Application Server
- Jakarta Pluto
 - open-source implementation of Portlet API
 - Used by Jetspeed, uPortal, wsrp4j
- Jetspeed 2 still not out...
- Emerging open source projects Exo and Liferay
- And GridSphere...



GridSphere 2.0 Feature List



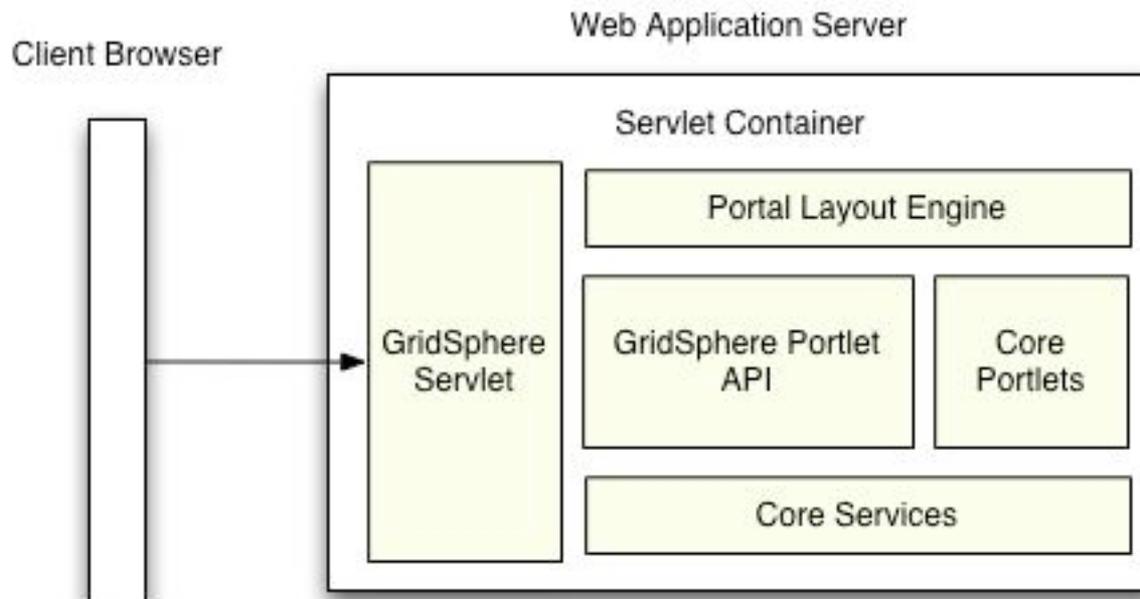
- Portlet API passed Sun TCK and is 100% JSR 168 compliant
- Additional Portlet API implementation nearly fully compatible with IBM's WebSphere 4.2. (GridSphere 2.0)
- Support for the easy development and integration of new portlet applications
- Higher-level model for building complex portlets using visual beans and the GridSphere User Interface (UI) tag library.
- Flexible XML based portal presentation description can be easily modified to create customized portal layouts.
- Built-in support for Role Based Access Control (RBAC) separating users into guests, users, admins and super users.
- Sophisticated portlet service model that allows for creation and reusability of new business logic with support for persistence of data

GridSphere 2.0 Feature List ...

- Persistence of data provided using Hibernate OQL for database support
- Integrated Junit/Cactus unit tests for complete server side testing of portlet services including the generation of test reports.
- GridSphere core portlets:
 - Login, Logout, Locale settings
 - Profile personalization and Layout customization
 - Administration portlets for creation of users, groups, portlet management and portal layout customization
- Localization support in the Portlet API implementation and portlets support French, English, German, Czech, Polish, Hungarian and Italian.
- Open-source and 100% free! :-)

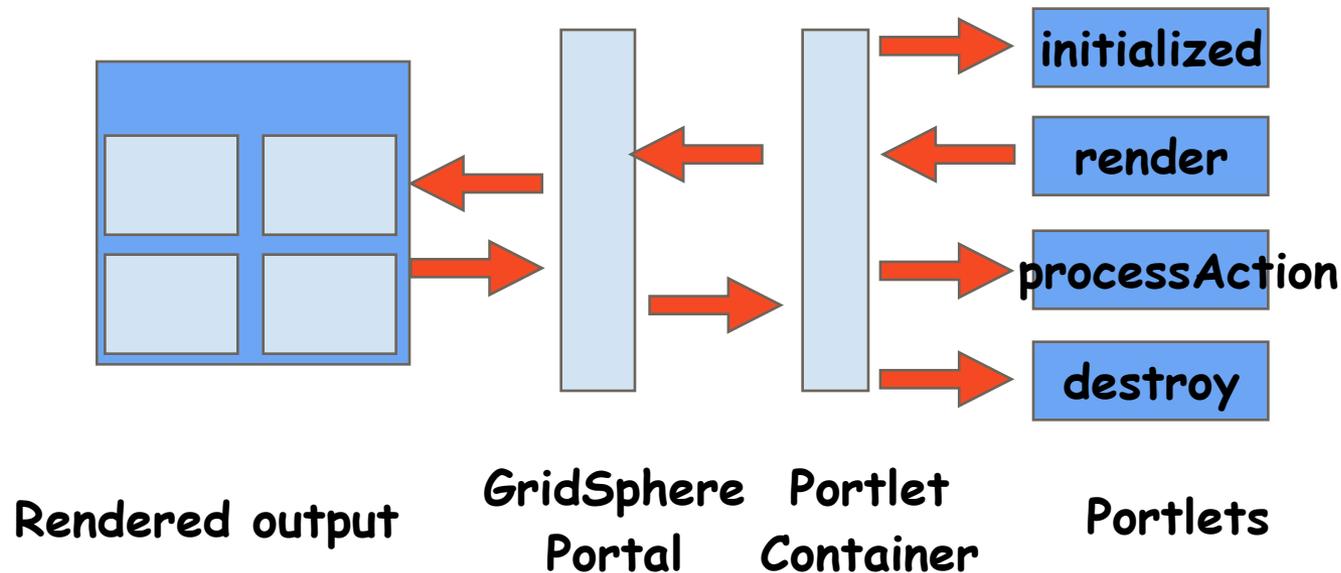
GridSphere Implementation

- The GridSphere portlet container is implemented as a web application and requires a hosting environment such as the Jakarta Tomcat container.
- Many additional libraries are used and deployed to the servlet container during installation.



Portlet Life-Cycle

- The GridSphere *portlet container* loads and instantiates portlet classes.



JSR 168 Portlet Interfaces

- **Portlet, GenericPortlet**
 - All portlets must implement Portlet interface or subclass from GenericPortlet that define portlet lifecycle methods
- **PortletConfig**
 - Provides portlet with its initial configuration
- **RenderRequest, ActionRequest**
 - Encapsulates the a request sent by client
- **RenderResponse, ActionResponse**
 - Represents response to client
- **PortletContext**
 - Defines portlets view of the portlet container in which portlet is running
- **PortalContext**
 - Provides vendor information and portal properties

PortletRequest additions

- PortletPreferences
 - Contains user-specific persistent data
- PortletSession
 - Holds user-specific information needed to provide personalized view
- PortletWindow
 - Defines “window” in which portlet is displayed
- PortletMode
 - Defines “mode” in which portlet is operating
- User information defined in request attribute as a map of key value pairs

- View

- The standard view of a portlet on a Web page

- Edit

- Allows portlet to capture user-specific parameterization, which leads to personalized view of the portlet

- Help

- A portlet should provide online-help with this mode

- Configure (not required by spec. but supported)

- Allows a portlet to display its own configuration mode
- Generally, you want to restrict access to this mode to portal administrators

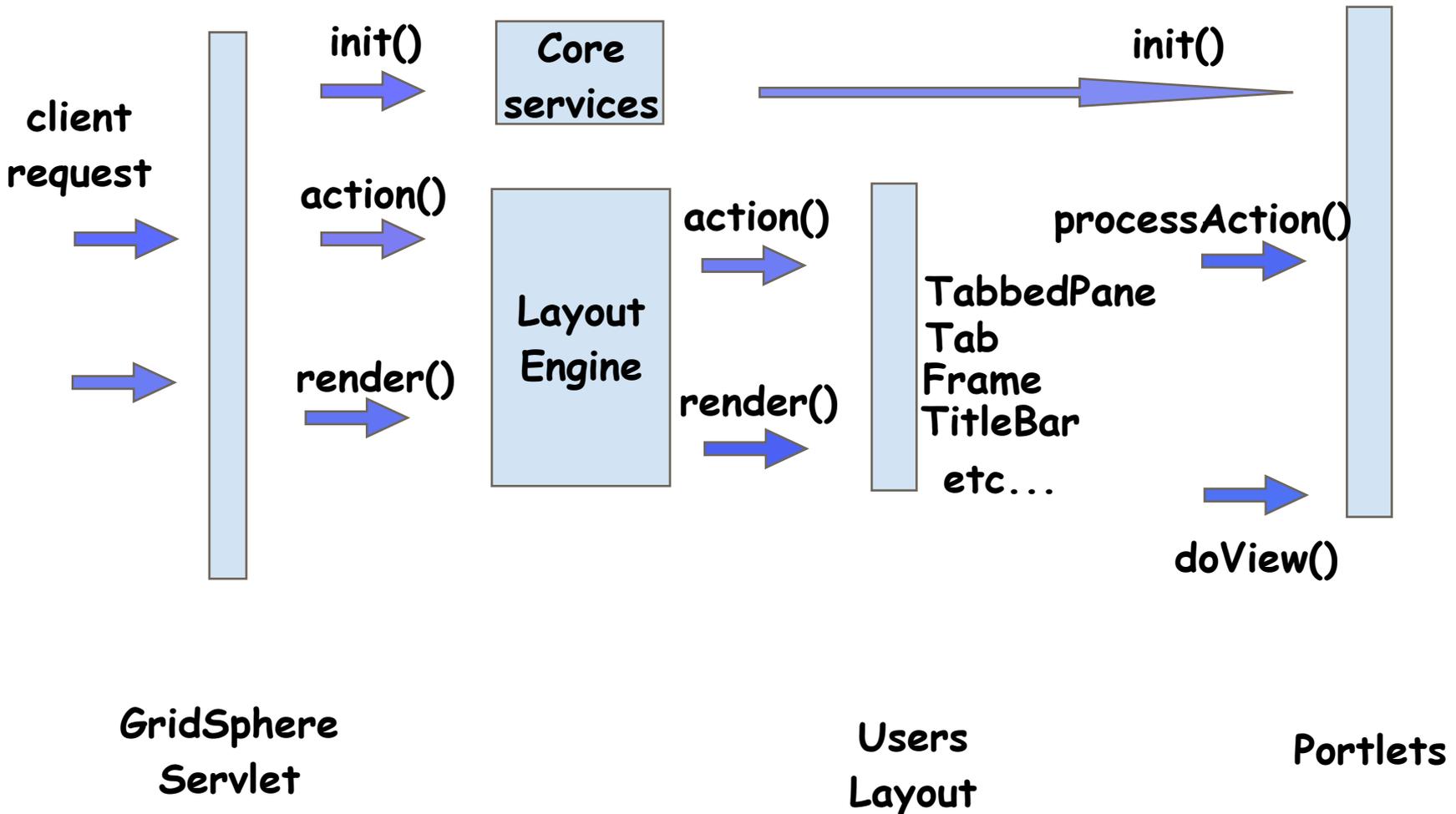
Portlet Deployment Descriptor

- A Portlet Deployment Descriptor provides the portlet container with portlet configuration information
- Defines a collection of portlet definitions as an XML schema e.g. portlet.xml
- A portlet definition defines configuration information valid for a single portlet/servlet for all users
 - Specifies portlet deployment attributes
 - Supported markups, portlet modes and window states
 - Display name and title information
 - Security role information
 - Supported locales
 - Time for portlet to expire cached output

- <portlet>

```
<description xml:lang="en">A TextMessagingPortlet</description>
<portlet-name>TextMessagingPortlet</portlet-name>
<display-name xml:lang="en">TextMessaging</display-name>
<portlet-class>org.gridlab.gridsphere.extras.portlets.textmessaging.TextMessagingPortlet</portlet-
class>
<expiration-cache>60</expiration-cache>
<supports>
  <mime-type>text/html</mime-type>
  <portlet-mode>help</portlet-mode>
</supports>
<supports>
  <mime-type>text/wml</mime-type>
  <portlet-mode>edit</portlet-mode>
  <portlet-mode>help</portlet-mode>
</supports>
<supported-locale>en</supported-locale>
<portlet-info>
  <title>TextMessaging</title>
  <short-title>TextMessaging</short-title>
  <keywords>textmessaging</keywords>
</portlet-info>
<security-role-ref>
  <role-name>GUEST</role-name>
  <role-link>auth-user</role-link>
</security-role-ref>
</portlet>
```

GridSphere Lifecycle



- Portal uses header and double layer tabbed pane to organize content
- Portal layout specified as XML descriptor:

```
<portlet-tab>
  <title>Examples</title>
  <portlet-tabbed-pane style="sub-menu">
    <portlet-tab>
      <title lang="en">Hello</title>
      <portlet-panel>
        <grid-layout>
          <portlet-frame>
            <portlet-class>org.gridlab.gridsphere.portlets.examples.HalloWelt.1</portlet-class>
          </portlet-frame>
        </grid-layout>
      </portlet-panel>
    </portlet-tab>
  </portlet-tabbed-pane>
</portlet-tab>
```

- Layout component library similar to Java AWT or Swing
- Basic layout components:
 - PortletTabbedPane
 - PortletTab
 - PortletFrame
 - PortletTitleBar
 - PortletPanel
 - PortletGridLayout
- Some components act as containers for other components e.g. PortletPanel
- All components have **init**, **action** and **render** lifecycle methods
- Follows the Composite Design Pattern
- Components are marshalled/unmarshalled to XML using Castor libraries

- GridSphere provides value-added UI JSP tag library
- Goal is to minimize HTML usage
 - UI tags can provide platform independence e.g. support HTML and WML
- Example tag usage in JSP:

```
<%@ taglib uri="/portletUI" prefix="ui" %>  
<%@ taglib uri="http://java.sun.com/portlet" prefix="portlet" %>  
<portlet:defineObjects/>  
<ui:form action="login">  
<ui:inputfield name="username" size="8" maxlength="20"/>  
<ui:passwordfield name="password" size="8" maxlength="20"/>  
</ui:form>
```

- Additional “container” tags make it possible to quickly create interfaces that hide CSS/HTML from presentation design

```
<%@ taglib uri="/portletUI" prefix="ui" %>
```

```
<%@ taglib uri="http://java.sun.com/portlet" prefix="portlet" %>
```

```
<portlet:defineObjects/>
```

```
  <ui:panel>
```

```
    <ui:messagebox beanId="displayMsg"/>
```

```
    <ui:frame>
```

```
      <ui:tablerow>
```

```
        <ui:tablecell width="50%">
```

```
          <ui:actionlink action="doSomething"/>
```

```
        </ui:tablecell>
```

```
        <ui:tablecell/>
```

```
      </ui:tablerow>
```

```
    </ui:frame>
```

```
  </ui:panel>
```

Visual Bean Model

- For each visual tag, there is a visual bean counterpart that provides access to the visual component from the portlet.
- A visual bean is obtained from a FormEvent object

```
public void doViewUserFiles(RenderFormEvent event) throws PortletException {
    log.debug("in LoginPortlet: doViewUser");
    RenderRequest request = event.getRenderRequest();
    ListBoxBean lb = event.getListBoxBean("filelist");
    lb.clear();
    String userid = (String)request.getAttribute("userid");
    String[] list = userStorage.getFileList(userid);
    ...
}
```

- A “portlet service” moves logic from a portlet to a reusable service that may be used by other portlets
- **PortletService** is the base interface for all portlet services.
- PortletService instances are created by a **PortletServiceFactory**.
- Similar to Portlets, PortletService objects are configured at initialization with a **PortletServiceConfig** object.
- A service may be created per instance or cached
- PortletServices can make use of GridSphere provided persistence classes.
- Similar to Spring service framework



Portlet Services Descriptor



```
<portlet-services>
  <service>
    <name>Portlet Manager Service</name>
    <description>Provides Administration Capabilities for Portlet Web Applications</description>
    <interface>org.gridlab.gridsphere.services.core.registry.PortletManagerService</interface>
    <implementation>org.gridlab.gridsphere.services.core.registry.impl.PortletManagerServiceImpl</
    implementation>
  </service>

  <service>
    <name>Login Service</name>
    <description>Provides Login Capabilities</description>
    <interface>org.gridlab.gridsphere.services.core.user.LoginService</interface>
    <implementation>org.gridlab.gridsphere.services.core.user.impl.LoginServiceImpl</implementation>
  </service>
```

- GridSphere Framework includes basic support for persistent objects using PersistenceManager singleton
- PersistenceManager uses open-source Hibernate libraries which provides mechanisms for mapping objects to SQL and an object query language (OQL)
- Hibernate supports many databases including hsqldb, MySQL, Postgres, Oracle, etc..
- Every portlet app manages its own database keeping data independent



GridSphere Security



- Access control based on 4 defined roles within a group:
 - Guest < User < Admin < Super
- A guest is anyone that has not logged in
- An admin has permissions to manage users in the group and edit group layout
- Super is the portal administrator
- A group defines a set of deployed portlets with access restrictions
- Users can be in multiple groups, but can only add portlets that they have access to

- Login/Logout portlet
 - Enables user to logon/logout
 - Allows user to refresh password if forgotten
 - Configurable option enables new users to request an account .
- Locale portlet
 - Simple locale chooser in the portal banner offers support for 7 languages
- User profile portlet
 - Enables users to configure personal information e.g. name, email, locale, preferences
- Layout configuration portlet
 - Enables users to customize their layout by creating new tabs which portlets can be easily added to.

- User Manager Portlet
 - Enables admins to create/delete/edit portal users
- Group Manager Portlet
 - Enables admins to add/remove users to/from portlet groups
 - Enables admins to select whether a group is public or private (public means anyone can join, private requires an administrator approval)
- Portlet Manager Portlet
 - Enables admins to start, stop, or redeploy a portlet application
- Layout Manager Portlet
 - Enables admins to edit existing group layouts

Extra Portlets

- GridSphere provides “extras” portlet application:
 - Text Messaging portlet communicates to IM users
 - Photo album portlet allows users to upload and display photos
 - Poll portlet to create polls and display results
 - Chart portlets demonstrating a chart service that uses JFreeChart to display plots, timeseries graphs, etc.
 - Commander portlet manages secure portal filesystem to upload, download and transfer files

Future directions

- Integrate JSF into portlet development
- Develop a WSRP “consumer” portlet using WSRP4J
- Support JSR 170, content management
- Further improve upon the GridSphere portlet development model
- Continue seeking collaborations with other groups requiring portal frameworks