Abstract

HPC Portal Development Platform (Figure 1) is for web portals that design to support access to in the field of high performance computing and E-Business fields. It draws upon best practices derived from the collective experience of many projects such as personal portals, small business portals, enterprise portals, educational portal, infrastructure Portal and other kinds of portals. It can also allow Java developers to speed up the development and deployment process by using this platform. It provides the robust IT architecture for high performance computing and enterprise business.

More specifically, this paper will also drill down to describe the following in detail.

✧ How this development platform works within Eclipse
✧ Where to place POJO and EJB for J2EE programming
✧ Where to see the exceptions and errors
✧ How to perform the compilation and deployment within this development platform
✧ How to start up and shutdown the built-in JBoss-Tomcat Application Server

Keywords: HPC Portal Development Platform, Job Submit Portlet, Property Portlet.

1. Introduction

For several reasons including budget constraints, new portals are needed to be based on an open source solution. Open source portal is important to the different kinds of organizations, educational services, and other business companies in a number of ways. Open source portal wants the technology to be maintainable and customizable. Open Source Portal provides the control it needed to get the most from the software. The mix of skills of open source portal development and support team made an open source portal solution preferable because it costs less to own and is more flexible than proprietary products.

In order to provide the up-to-date and best portal development platform for the field in high performance computing and E-Business, HPC Portal Development Platform (Figure 1) is designed and generated for this purpose. It provides the best platform for Java developers in the field of high performance computing to design, implement, configure and deploy. Its architecture is robust, stable and advances because it utilizes the Tomcat (Web Server) and JBoss (Java EE Application Server) to separate the presentation tier, the business tier and the database tier. It also allows developers to create context-rich applications that satisfy these requirements. In addition, this development platform provides the natural user interaction environment for your SOA (Service Oriented Architecture) applications and allows you to leverage all types of services in creating a better, more effective user experience.

Figure 1. HPC Portal Development Platform

2. Content

The HPC Portal Development Platform (Figure 1) will allow Java developers to break down the boundaries between Web-based portals and the applications of high performance computing. It will enable them to create flexible and content-sensitive working environments that are based on rich content, portlets, and components in an open, standards-based architecture. By specifically design and
implementation, the knowledge workers of high performance computing will use a single Web interface to access a wide range of HPC services, including communication and collaboration services, HPC applications, HPC content, and HPC search.

2.1 What does HPC Portal Development Platform possibly can do for high performance computing?

HPC Portal Development Platform (Figure 1) is built-in HPC Portal for developers or programmers to customize and scale the content of high performance computing. Being the development platform of HPC Portal, Java developers and programmers can design and implement the specific portlets as the following list shown for their own purposes.

- Role of Infrastructure Portal with the highest security for High Performance Computing
- Cluster Status
- Single Job Submission
- Queue Status
- Workflow
- Other specific portlets for HPC users to query.

This development platform allows having other particular portals within it, but it is required to have the extra configurations in order to do so.

2.2 What Major Benefits of HPC Portal Development Platform Provide?

(1) Optimize with Robust IT Architecture and Demands

HPC Portal Development Platform (Figure 1) can leverage your existing IT environment because it integrates the architecture of Liferay Enterprise Portal[4] with the bundled JBoss-Tomcat Application Server. It can works with the various database servers, or operating systems with the specific configurations.

JBoss-Tomcat Application Server is the standard Java EE (Java Enterprise Edition) Application Server, which provides the powerful functionalities for the Web and Java EE development. It’s also the most popular and widely used Java EE Application Server in the world wide. The JBoss Application Server (AS) also provides the clustering support with High-availability (HA) and Load-balancing. When the server instances start in the all configuration, it detects each other and automatically forms a cluster.

(2) Organize and Access All Data and Applications via Single Sign On

HPC Portal Development Platform (Figure 1) provides you a single point of access to all your content, data, and information from both in-house applications and external sources. Single Sign On allows users to login once, and then to access all their information.

After signing in, the fine-grained permission provided allows you to control and customize who can access sensitive information and functionality in the different levels of the HPC fields by using the Communities Portlet and the other access control portlets.

(3) Collaboration and Customization

- In order to collaborate different groups of HPC users, this Platform allows the HPC users to create true communities of users by using several Collaboration portlets such as Instant Messaging, Message Boards, Blogs & Wikis.
- By enhancing their experience and generating user loyalty, individual HPC community members can provide their own pages with a user-defined URL.
- The HPC Portal within this platform allows users to drag-and-drop portlets to customize the unique preferences of a user or community.
- Without dealing with complex code, users can utilize the embedded themes and available portlets to change the look and feel within the HPC portal.

(4) Scale High Performance Computing

HPC Portal Development Platform (Figure 1) allows scaling with your organizations with clustering and the unlimited capacity for the contents and applications in the field of high performance computing and E-Business. Furthermore, this development platform helps your organization or business avoid “vendor lock-in” or dependence on a single third-party. It also allows organizations to leverage existing in-house expertise. In addition, it is the standards-based and developer familiarity with the key technologies, which will shorten development cycle.

(5) Other Specific Features
Control Panel: All of the administration tools have been unified into the Control Panel. UI users can administer the whole portal with ease. Besides that, it allows to add your own tools into it, and is for automatic delegation of administration.

HPC Portal includes the improvements to the web content management system.

Improved Structure: the structure of the bundle has been significantly improved so that it's completely self-contained (including its data) and thus makes life easier for administrators.

2.3 Platform Architecture of HPC Portal Development Platform

Empowering the information means giving workers the power to manipulate and change their applications to suit their work habits and specific needs. The framework of HPC Portal Development Platform (Figure 1) provides new Structs, Tiles, JSP and JSF components that allow developers to make any of their applications customizable. These new components act as containers into which developers can drop view component or portlet. With these capabilities in place, users can customize virtually any Structs or JSP pages by minimizing/maximizing, hiding/showing, or moving any component on the page.

The platform architecture (Figure 2) of HPC Portal Development Platform provides the support of any combination of multiple tiers – presentation, service, business logic, and database – to meet your specific load requirements, one processor at a time. It also uses Session EJ Bs which allows the developer to separate the Web server, EJB server, and database server to achieve clustering at three levels. This is true n-tier deploying and allows the most flexibility. Furthermore, this architecture supports the high availability, which means the zero down time for critical applications with HTTP Failover, Session Replication, and Hardware/Software Load Balancing.

Because Liferay Enterprise Portal[4] was benchmarked as among the most secure portal platforms using LogicLibrary's Logiscan suite, HPC Portal Development Platform (Figure 1) utilizes and integrates it to provide the industry standard, government-grade encryption technologies with the advanced algorithms such as DES, MD5 and RSA. It also contains JAAS Web security so that when a user logs in, their principal is propagated to the Servlet and EJB tiers. Because this platform contains the JBoss-Tomcat (Java EE) Application Server, the Remote Session EJ Bs can take advantage of this by checking security and permissions at the EJB level so it does not have be duplicated else where.

This development platform wraps the POJO implementations with Session EJ Bs to provide heavy scaling and transaction support required by large sites. Local Session EJ Bs exposes business logic to other Session EJ Bs and does not specifically check for security since they cannot be called remotely. Principals or business policies are also propagated to POJO implementations that are the base classes for Remote Session EJ Bs. There are more supports of this platform architecture (Figure 2) such as Page Caching and Dynamic Virtual Hosting. Page Caching contains full-page caching for static content in order to makes the web performance increase. To separate the various levels of security, Dynamic Virtual Hosting provides the suitable permission for individual community members to have their own page with a user-defined friendly URL.

In addition, this platform architecture provides Java developers or programmers to enable the function of mobility during the implementation. HPC users can access the portal via traditional and wireless devices.

![Figure 2. Platform Architecture](image)

HPC Portal Development Platform (Figure 1) is designed and constructed by using Liferay Enterprise Portal, in which utilizes Service Oriented Architecture (SOA) design principles, and provides the tools and framework to extend SOA to HPC application portlets.

Service Oriented Architecture (SOA) is an architectural style that guides all aspects of creating and using business processes, packaged as services,
throughout their lifecycle, as well as defining and provisioning the IT infrastructure that allows different applications to exchange data and participate in business processes loosely coupled from the operating systems and programming languages underlying those applications. [5]

To ease for HPC applications to communicate with each other, the Web Services is required. It uses XML standards to make Java, .NET, and other applications working together easily because of Web Services.

The quest for agility has spurred the recent rise of the adoption of service oriented architecture (SOA) and the face of modern IT integration architecture is changing. Technology stovepipes of the past are now being connected by enterprise service bus (ESB) technology, which provides the backbone for networking, communication, mediation, and service container management needed to support SOA.

2.4 How does HPC Portal Development Platform work within Eclipse?

HPC Portal Development Platform (Figure 1) within the Eclipse (Figure 3; Java IDE Tool) provides the best development platform for users to customize and create the specific portlets for their particular purposes in their organizations or other companies.

Figure 3. HPC Portal Development Platform Within Eclipse

To drill down more depth of this Platform within Eclipse (Figure 3), the more powerful functionalities with the ease of features will show up. This platform allows speeding up the development process during the time of implementation.

“ext-impl”: All of the implementation of the POJO and Enterprise Java Beans is in this package. Users are allowed to design and implement their own portlets for the desired purposes. This package also contains the source code of the generic HPC Portlets for developers and programmers to utilize without duplicate design and implementation. To customize the specific development purpose, Java Developers can customize and modify the source code for their specific HPC environments. In addition, the other specific configurations of the properties files should also be edited within this package.

“ext-lib”: This package allows users to include the extra library files in the packages of development, global, or portal. For instance: If users require accessing the database server via the remote host, the desired JDBC connector will be required to place in this package. Once the deployment process is in the execution state, the required library will be deployed into the portal engine, JBoss-Tomcat Application Server. For example, if one development team of a business organization needs to access the specific database system, this team can place the all of necessary library files into this package for the development or production purpose.

“ext-web”: For the User Interface (UI) development such as JSP, Structs, Tiles, JSF, HTML, CSS and so on, the UI designer will require to place their UI pages into this package. This package is also well-constructed for the individual portlet development. UI Developers can design and implement their own portlet pages. In addition to that, other Web related technologies should be placed into this package.

“hpc-portal” Tag: Java Developers can simply double-click this tag in Ant window. This will automatically perform to finish the process of the Compilation and Deployment into the JBoss-Tomcat Application Server. Usually, compilation and deployment are time-consuming and error-prone process, but this development platform assists developers to complete these steps easily without worrying the mistakes during the deployment. Therefore, this step could speed up the development process, and save much more time for Java developers.

“Console” Window (Figure 4): If there are any exceptions or errors occurred during the development phase, the Console window will display them for the debugging purpose.
“Start HPC Portal Server” (Figure 5): This development platform is already well configured to boot up or shutdown the built-in server, JBoss-Tomcat Application Server. Therefore, it is quite robust and stable by using this development platform. Once the compilation and deployment process completes, the built-in portal server can be started for the customization by issuing the following command.

- Path: 
  `/hpc-portal-5.2.2/hpc-portal/app-server/jboss-tomcat-5.0.0/bin`
- Command: 
  `./run.sh -c <config_name> -b <bind_address>`
- Sample Command: 
  `./run.sh -b development.nchc.org.tw`

2.5 Demo

After the HPC portal is up and running, the users will see the login page of HPC Portal as shown on the following figure (Figure 6). Those default portlets are all highly customizable and configured for any of specific groups or communities.

HPC Portal Development Platform provides the up-to-date and popular technologies with this platform. As the following figure shown (Figure 7), the right pane contains more than 60 portlets for High Performance Computing and E-Business. Java developers can also continue to design and implement the HPC or E-Business portlets in order to fulfill their own specific purposes.

3. Job Submit Portlet

Job Submit Portlet (Figure 8) within HPC Portal Development Platform is used as the standard portlet for High Performance Computing. It allows HPC Portal developers continually to design, implement, integrate and access the backend resources in their particular HPC environments. This portlet allows HPC users to submit a single job to the backend resources.
for computation. For example, the HPC users can use this service to submit a generic job into one of the HPC computing systems for complex and high speed computation.

4. Property Portlet

Property Portlet (Figure 9) is used as the standard portlet for High Performance Computing. It allows HPC Portal administrators to access the specific properties such as the LDAP Server or MDS Server. The HPC Portal developers can modify this portlet for their own needs for their particular HPC environments.

5. Conclusion

As organizations, any size of the business companies and personal users continually reinvent them and strive for higher levels of efficiency and productivity, the demands on the information worker are continually increasing. To meet these ever growing demands, the information worker in the field of high performance computing and other business fields needs a better, more productive portal development platform such as HPC Portal Development Platform. This platform must be role- and task- focused so that all elements of a task are provided directly in context for the user. And perhaps most importantly, the information worker must have the ability to tailor and evolve the environment based on their own preferences and the needs of their organization.

6. Web Site for Download


7. References


