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GridLab - A Grid Application Toolkit and Testbed

## **Deliverable 4.8: Final release of Cactus and Generic Simulation Portals**

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**Abstract:** This document reports on GridLab Deliverable 4.8.

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# 1 Final release of Cactus and Generic Simulation Portals

Work Package 4 has been actively supporting the Albert Einstein Institute (AEI) Numerical Relativity Portal since Month 24 of the project. Because we plan to continue supporting the AEI Portal beyond the scope of the GridLab Project, we are continually enhancing and developing new releases of the GridSphere Project, the Cactus Code Portlets Project, which provides interfaces tailored to Cactus applications, and the AEI Portal Project, serving the particular needs of the AEI. Our software also serves as the basis for the Center for Computation (CCT) Numerical Relativity Portal, based at Louisiana State University (CCT). This document summarizes on the functionality we currently offer.

## 1.1 Cactus Simulation Portals

Cactus Simulation Portals can be easily created by installing GridSphere, Grid Portlets and the Cactus Code Portlets web application. There are at least two GridSphere portals configured in this manner: the AEI Numerical Relativity Portal and the CCT Numerical Relativity Portal. Both of these portals include additional GridSphere web applications and are tailored to the particular communities they serve.

### 1.1.1 General Features

The general portal features described below are provided by the GridSphere core framework. Since these features are required by all Grid portals, and since they are an integral part of the complete user experience, we summarize them here in this document. More information about GridSphere's core features can be found in GridSphere's documentation.

- *User administration* - Portal administrators can manage user accounts online. Administrators can define the access rights of user accounts and, moreover, specify whether guests can create their own user accounts.
- *Group administration* - Portal administrators can define groups of portlets and specify which users that have access to those groups.
- *Site layout administration* - Portal administrators can change the color theme, define portlet tabs for all users to see and modify the page layout of their portal web site online.
- *User profile management* - Portal users can edit their personal information, set their locale (language date) preferences, and specify what portlet groups they would like to join.
- *Personal layout management* - Portal users can select which color theme they want to see when they login and also define their own portlet tabs.

### 1.1.2 Support for the Grid

The grid features described below are provided by the Grid Portlets Project, which builds upon GridSphere's core features to offer a Grid portal development framework. Since these features are required by all Grid portals, and because they are an integral part of the complete user experience, we summarize them here in this document. More information about Grid Portlets can be found in in the Grid Portlets documentation.

- *Resource Administration* - The Resource Registry Portlet enables portal administrators can manage at install time or online the resources that Grid Portlets makes available to portal users.

- *Resource Browsing* - Portal users can browse the resources Grid Portlets has been configured to make available using the Resource Browser Portlet . This includes the ability to see the services, job queues and accounts that are available on computing resources.
- *Single Sign-On* - Grid Portlets supports single sign-on with credential retrieval from MyProxy and authentication to an LDAP server.
- *Credential Retrieval* - The Credential Retrieval Portlet supports the ability to retrieve credentials from credential repositories like the MyProxy Credential Repository. The Credential Retrieval Portlet also supports the ability to specify whether users would like to retrieve their credentials at login to support single sign-on to the Grid. This is the default setting for Grid Portlets.
- *Job Management* - The Job Submission Portlet supports job submission (with GRAM directly or GRMS) and job migration (with GRMS only). The Grid Portlets Job Submission Portlet offers a generic interface for submitting jobs that exposes all the features currently offered by our underlying job submission API. However, the Job Submission Portlet supports a plugin mechanism, making it easy to offer job submission interfaces tailored to any application. This feature is exploited in the Cactus Code Portlets Project, described below.
- *File Browsing* - Grid Portlets provides an interface for browsing files on remote computing resources in the File Browser Portlet and makes this interface available as a dialog for selecting files in the Job Submission Portlet. Moreover, these interfaces operate seamlessly with logical files to provide a complete environment for managing files on the Grid.

### 1.1.3 Support for Cactus Applications

The Cactus Code Portlets contains portlets and portlet services tailored to the needs of Cactus applications. The Cactus Code Portlets supports the ability to install Cactus source code, build Cactus applications and execute Cactus applications with interfaces tailored to Cactus. The functionality offered in the Cactus Code Portlets is summarized below.

- *Cactus Software Installation* - The Cactus Installation Portlet support the ability to deploy Cactus from CVS onto any resource made available to Grid Portlets.
- *Cactus Application Complication* - The Cactus Build Portlet supports the ability to build Cactus applications wherever Cactus is installed on the Grid. With the Cactus Build Portlet, one can easily CVS update the source code required for a particular application and rebuild the application as necessary.
- *Cactus Parameter Files* - The Cactus Parameter File Portlet enables users to upload and edit Cactus Parameter Files.
- *Cactus Job Submission* - The Cactus Code Portlets Project contains job submission interfaces which plugin to the Grid Portlets Job Submission Portlet. These interfaces are tailored towards submitting Cactus batch jobs and are much simpler to use than the generic interface offered in Grid Portlets.
- *Cactus Application Tracking* - The Cactus Simulation Portlet lists all the Cactus applications that have been announced to the portal. The Cactus Code Portlets project works in conjunction with Cactus Thorn Announce. Thorn Announce can send notification

messages to any Cactus-enabled portal after an application has initialized, when the application advances a time step, and when an application is about to shutdown. The Cactus Simulation Portlet allows users to specify they would like to be notified by email, SMS or AIM (chat). Moreover, users can view both the simulations that are made "public" (specified either as a parameter available in Thorn Announce or online through the Cactus Simulation Portlet) and those that are "private" (available to their user account only). It is our most successful and often used portlet.

#### 1.1.4 Support for AEI

The AEI Portal Project contains Web pages and content tailored to the needs of the AEI. In this project, we describe the general goals of AEI and provide content describing the various technologies used to build the AEI Portal. The AEI Portal Project is deployed only on the AEI Portal. The CCT Numerical Portal is supported in a similar manner.

### 1.2 General Simulation Portals

General support for simulations is available simply by installing and configuring GridSphere and Grid Portlets. We recommend, however, to take a similar approach to Cactus Code Portlets. Application communities are best served with interfaces tailored to the needs of their particular applications and resource requirements. For proof of concept, the Cactus Code Portlets project also contains support for Triana applications. Triana applications that send notification messages to the CCT Numerical Relativity Portal, for example, can be viewed and controlled from the Triana Simulation Portlet. The same notification mechanisms offered in the Cactus Simulation Portlet can be used to provide users with a seamless way for interacting with their Triana applications on the Grid.

## 2 Conclusion

In conclusion, Work Package 4 feels it has met the requirements of GridLab Deliverable 4.8, though we recognize that their many improvements we can make to our overall solution. Therefore, our plans are to continue enhancing and improving on the general design of our core technologies, as well as the application specific project with which we are involved. Please visit the GridSphere Project Website (<http://www.gridisphere.org>) for more information about our core technologies, and the AEI Numerical Relativity Portal (<http://www.aei.mpg.de>) to see the solution we have delivered to the numerical relativists at AEI.