

**Annual Report for Period:**09/2003 - 09/2004

**Submitted on:** 07/28/2004

**Principal Investigator:** Pierce, Marlon E.

**Award ID:** 0330613

**Organization:** Indiana University

**Title:**

NMI: Collaborative Proposal: Middleware for Grid Portal Development

### Project Participants

#### Senior Personnel

**Name:** Pierce, Marlon

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Pierce's contribution has been to oversee the development and integration of the OGCE newsgroup and bibtex systems, both included in the portal 1.0 release. These applications include portlet user interfaces and Java Messaging System-based applications.

He has also developed and integrated into the project the the Grid application manager applications that demonstrate the use of JSP pages (instead of the usual Velocity pages). These are based on portlet extensions to Jetspeed developed at the Community Grids Lab.

Pierce also oversees the OGCE portal integration activity, organizing contribution and testing processes. He works closely with developers at the partner universities to ensure smooth integration, reliable build processes, and lack of code conflicts. Pierce also leads the portal documentation efforts.

Pierce's group also maintains the OGCE collaboratory, [www.collab-ogce.org](http://www.collab-ogce.org). This site is built from OGCE software.

**Name:** Gannon, Dennis

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Dennis Gannon and his group lead the development and integration of the Grid tool-related portlets: MyProxy portlets, basic job submission portlets, GridFTP portlets, and XDirectory/GridContext portlets. The latter include interfaces to Grid Application Factory services. Gannon's group also developed the security underpinnings that allow proxy credentials to be shared with all other portlets.

Dr. Gannon was also involved in numerous outreach activities, as described in the appropriate section.

**Name:** Fox, Geoffrey

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Fox leads the development of audio/video collaboration services for the OGCE. These tools have been demonstrated at Supercomputing 2004 and are being integrated into the NASA Ames SOG portal activity (based on the OGCE release). These services have been in a development phase through the first year of the OGCE activity and have reached a stable state, suitable now for integration in the next OGCE portal release (Supercomputing 2005).

Fox also participates in OGCE oversight and outreach role. Through his extensive contacts with Grid activities in the US and UK, he ensures that the OGCE portal activity and approach are well advertised to many groups, such as NASA, the DOD, and the UK e-Science program.

**Name:** Plale, Beth

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Over the 9 months since project inception, Professor Plale has guided the work of Charlie Moad and Craig Jacobs in the development of functionality for the OGCE portal. Professor Plale gave several talks on the OGCE portal at the Research@Indiana and UIUC NCSA Alliance booths at the International Conference for High Performance Computing and Communications (SC2003) in Phoenix AZ, November 2003. As PI in the LEAD project, Prof Plale has been developing a data

management solution to personalized information management that leverages the OGCE portal for its user interface. In the upcoming year, Prof Plale will participate in the effort to tailor the OGCE portal to the needs of the LEAD project. This will be achieved by working with users in the meteorology, and education and outreach community; and by continuing to develop data management related functionality for the portal.

## Post-doc

### Graduate Student

**Name:** Jacobs, Craig

**Worked for more than 160 Hours:** Yes

#### Contribution to Project:

Craig Jacobs expended 160+ hours developing a calendar service for the OGCE portal. The calendar service is designed as a standalone web service. The challenges are in that it must interface with the Chef portal calendar interface, as well as support standard calendar interfaces to other devices such as PDAs. The calendar service must support groups, and repeat entries. In addition, the service must provide a uniform view of a person's calendar from multiple instances of a portal server.

**Name:** Moad, Charlie

**Worked for more than 160 Hours:** Yes

#### Contribution to Project:

Charlie Moad expended 480+ hours on the OGCE project. Charlie developed a parallel rendering application that was fully integrated into the portal. A bottleneck we found during remote displaying of a parallel visualization task is a 100Mb Ethernet connection typically found between a cluster and a personal laptop or workstation. To address this, we use the off-screen rendering capability of Parallel VTK, and render the results to a file. Each time step is saved to an individual image file, then the results joined into a movie using ImageMagick, a freely available collection of utilities. Using GridFTP from the Globus Toolkit, the movie is transferred to the client workstation. The control flow is guided by a workflow script written in GridAnt (Argonne National Laboratories).

In the OGCE Grid portal each user has a Grid Context (Indiana University), a small online locker used to save metadata descriptions about files, services, URLs, etc. The Grid Context is employed to store a link to the GridAnt workflow, while another when clicked will display the final resulting movie in the browser. From job submission of the parallel rendering task to final showing of movie, the user need never leave the portal.

In addition, Charlie demonstrated the OGCE portal and installation at SC2003.

## Undergraduate Student

### Technician, Programmer

### Other Participant

### Research Experience for Undergraduates

## Organizational Partners

### Other Collaborators or Contacts

1. Texas Internet Grid for Research and Education (TIGRE): (J. Boisseau, PI, M. Thomas, collaborator), TACC is part of multi-institutional collaboration. See <http://www.hipcat.net/projects/tigre.php> for more information on TIGRE. For more information on TACC's role, see <http://www.tacc.utexas.edu/projects/tigre.php>.

2. UT Grid Project (J. Boisseau, PI): Heterogeneous campus grid project being built in collaboration with IBM. See <http://utgrid.utexas.edu/project/> for more information.

3. SCEC Portal (M. Thomas): working with SDSC team to use OGCE for project portal.

4. SDSC Visualization Services Portal (M. Thomas). We are working with SDSC visualization group to convert existing portal to OGCE framework.
5. Cosmic Web Portal (M. Norman, PI): NCSA (Daues) and TACC (Thomas) are working with Norman to plan a new Cosmic Web Portal based on the OGCE release. This collaboration evolved in part out of the March presentation by Thomas at SDSC.
6. Molecular Dynamics Portal (J. Boisseau, PI): TACC is working with the University of Texas Southwestern School of Medicine to build a portal providing access to applications including NAMD, AMBER, CHARMM, and GROMACS.
7. M. Thomas, M. Pierce, G. Fox, and D. Gannon are all participants in the DOE SciDAC project. Our major activity is building the Fusion Grid Portal on top of the OGCE base software. Project partners include the SDSC Storage Resource Broker team (R. Moore, PI) and the Fusion Grid (David Schissel, PI). This project focuses on Fusion specific application portlets and advanced services (such as audio/video collaboration), whereas the OGCE focuses on hardened, generic services.
8. Several OGCE team members work closely with the TeraGrid project. NCSA is one of the TeraGrid principal sites, and IU and TACC are extended TeraGrid facilities. M. Thomas (TACC) leads the TeraGrid user portal team, which includes IU OGCE team member Marcus Christie. Christie has developed the TeraGrid System Portal prototype, based on the OGCE release. The prototype is available from <http://www.extreme.indiana.edu:18081/teragrid/index.jsp>.
9. D. Gannon (PI) and B. Plale (CO-I) are members of the LEAD project for atmospheric studies (University of Oklahoma, lead). IU leads the Grid and portal activities. More information on LEAD is available from <http://lead.ou.edu/LEAD%20II/participants.htm>.
10. M. Pierce and G. Fox collaborate with NASA JPL (Andrea Donnellan, PI), UC-Davis (J. Rundle), UC-Irvine (L. Grant), and USC (D. McLeod) to develop an application portal, QuakeSim, to support earthquake simulation applications. For more information on the QuakeSim project, see <http://www-aig.jpl.nasa.gov/public/dus/quakesim/>.
11. C. Severance and other University of Michigan team members have had numerous external contacts: meeting with the interaction with the NEES project (throughout the year), interaction with the Sakai project (throughout the year), working with the Collaboratory on Multiscale Chemistry (CMCS) throughout the year.
12. The Michigan group has also held collaborative meetings with the JISC Portal Group (2/2004 and 3/2004), meeting with the DOE Grid Portals Group (3/2004), meeting with SDSC (5/2004), meeting with GridSphere (EU Grid) (3/2004). For more information on JISC, see <http://www.jisc.ac.uk/>. For more information on GridSphere, see <http://www.gridisphere.org/gridisphere/gridisphere>.
13. Gregor von Laszewski has given a talk in January 2004 at GGF 10 about the design of workflow components developed on the Ant framework with its possible integration into a portal based on OGCE.
14. Gregor von Laszewski has given a talk in March 2004 at GGF 11 about the design of workflow components developed on a new workflow engine called Karajan with its possible integration into a portal based on OGCE.

### Activities and Findings

#### **Research and Education Activities: (See PDF version submitted by PI at the end of the report)**

##### Activities and Findings

##### Major Research and Education Activities

The following summarizes our activities, based on the deliverables listed in the cooperative agreement. To summarize, we have developed a downloadable Grid portal system that is documented and simple to install. A live version of our portal also serves as our group collaboratory web site: <http://www.collab-ogce.org>.

##### Outreach Deliverables

The project team members actively participated in the outreach deliverables listed in the Cooperative Agreement. We were well represented at the Global Grid Forum, Grid Summer School, and Edinburgh meetings, as detailed in the 'Outreach' section of this annual report. We also submitted the initial draft of the portlets best practices document. The GGF Grid Computing Research Group went on hiatus during the period of performance, so we have switched our focus to the formation of the SAGA (Simple API for Grid Applications) Research Group. This activity is led by Gregor von Laszewski with participation from other team members (including Mary Thomas). The major thrust of this

research group is (as the name indicates) to develop a common API for Grid applications, which will be directly used by OGCE portlets, among other clients.

#### Grid Portals Consortium Collaboratory

The initial collaboratory system was deployed at Argonne National labs and includes the [www.ogce.org](http://www.ogce.org) web site, with software downloads, project information and contacts, and a team CVS repository (viewable from <http://www.ogce.org/viewcvs/viewcvs.cgi/>). ANL also maintains public and internal mailing lists for the project.

Because of difficult installation policies at ANL, the demonstration collaboratory is being run by Indiana University. This collaboratory is built from OGCE software and serves as a demonstration of our system: <http://www.collab-ogce.org>.

Our project's initial web site, cvs repository, and mailing lists were put in place during the first quarter of the project (Sep-Nov). The collaboratory web site was made available during the third quarter (Mar-May). We also maintain an active bugzilla.

Because IU provides a simpler environment for installing and running software, and because of numerous security instances at ANL, we are in the process of moving all collaboratory components to IU. The demonstration site, [www.collab-ogce.org](http://www.collab-ogce.org), has already been updated to include the contact information, downloads, documentation, and bugzilla links.

#### Grid Portal Consortium Toolkit

Our major deliverables were divided into two sets: one for Supercomputing 2003 and one to coincide with the GRIDS center R5 release. The SC03 release was made and was demonstrated at numerous SC venues, as described in our outreach section. We had an interim release in January that included some bug fixes and a significantly trimmed down list of jars. The second deliverable was released in late May.

The releases were packaged as single downloads that included everything needed to install and run the portal except a) Apache Ant and b) because of licensing concerns, the MySQL JDBC connector. The basic portal download can be configured by editing a single parameter file and can be installed with a single command ('ant deploy'). The May release includes simple build options, allowing users to pick the desired portal content group (information, Grid, etc.) All releases were documented with FAQs, installation guides, user guides, and administration guides.

The following were included in the SC release:

1. Discussion boards, announcements, chat and messaging portlets, calendar tools. These were delivered by the University of Michigan along with the Chef 1.0.7 framework that we used as the portal container. These use an internal (to the portal) event system. This release also includes basic group sharing capabilities for these tools and the ability to create group spaces in the portal.
2. Newsgroup and citation browser portlets, developed and integrated by IU. These were coupled to external services that are included in a supplemental release.
3. Remote file management portlets: these included the GridFTP interface of IU and the WebDAV-based document system of UM. The TACC GridFTP portlet was deemed to be redundant with the IU interface, so TACC focused on additional deliverables (below).
4. Grid Information and Monitoring services, including LDAP/GRIS/GIIS portlet interfaces (IU) and GPIR portlet interfaces (TACC). The GPIR initial release points to TACC resources for demonstration in this release. Full GPIR support was included in the May release.
5. Portlet interfaces to MyProxy (IU).

All of these deliverables made use of the Java COG kit of the University of Chicago. COG developments during this period included an upgrade of the security libraries.

The following were included in the May release:

1. OGRE client portlets and a sample application for interacting with the NCSA OGRE system for managing applications. This was renamed from the Application Manager Web Service in the cooperative agreement. The OGRE system is available for download and extensively documented as part of this deliverable.
2. Science application tools from IU. These interfaces to the XDirectory system, called GridContext in the portal release. The XDirectory server side was packaged as a separate download and is available through the OGCE website. The GridContext system, in addition to serving as a general purpose notebook, acts as an interface to the application factory services, allowing users to launch jobs, browse results posted via XEvents, and interact with applets. This deliverable was actually included in the SC release.
3. IU also included application manager portlets that demonstrate how to manage application information and integrate this into an integrated set of portlets that combine GRAM job submission and GridFTP interfaces. In the process of developing these interfaces, we also developed a JSP compatible portlet type that can be used in place of the normal Velocity-based portlet tools used by the other portlets. This can be used to integrate pre-existing JSP web pages into the OGCE environment. JSP and Velocity portlet development documents are available through the portal collaboratory website.
4. The GPIR system was integrated with the portal. The portal system itself included updated GPIR portlets in the main release. The GPIR backend services were included as a separate download. Documentation for running the OGCE with GPIR service installations was developed and included in the release.

This release was validated against the GRIDS center testbed at the University of Wisconsin for the R5 release. We did find and document one incompatibility: the MyProxy portlet can only recover credentials from the 6.x version of MyProxy server if they are initially placed there with the COG MyProxy client. This is documented on the [www.collab-ogce.org](http://www.collab-ogce.org) website, along with workaround instructions. We are working with the MyProxy team to resolve this problem.

#### Additional Deliverables

1. We released several service implementations that can be run along with or external to the portal. These include a) the newsgroup system services, b) the OGRE server-side tools, and c) the XDirectory Grid Service (the backend of the GridContext portlet).
2. TACC include portlets and services for interfacing with Community Scheduling Framework services. CSF is a GT3 interface for accessing generic job schedulers, developed by Platform Computing through the GGF and freely available. TACC also developed a job scheduling system, with portlet interfaces, that can be used to set up multi-staged jobs across several grid hosts. This was included in the May release.
3. TACC developed and integrated a portal login system based on local Grid credentials rather than remote MyProxy credentials. This is set up as an optional build parameter.
4. IU and UM developed a MyProxy-based login system: if you choose this build option, your portal login and password will be mapped to a MyProxy client authentication.
5. The University of Chicago team developed workflow portlets on top of the COG kit. These were included in the May release.
6. We have also investigated the use of alternative single sign-on technologies for the portal. The Michigan group has, in collaboration with the MGrid activities and CITI at the University of Michigan, investigated the use of KX.505 credentials as a single sign-on mechanism for the OGCE portal. This sign-on mechanism combines Kerberos and PKI that bridges Kerberos authentication with browser-compatible PKI certificates. KX.509 and mod\_kx509 need to be improved to be made more general and simpler to install. Also, PKI certificate trust chains are complex to maintain. Initial support for KX.509 was included in the second release of OGCE. More work is needed before this is simple to use. The support will be improved in the next release of OGCE.

#### Problems

The major unresolved problem that we encountered was the integration of the NCSA metadata management system into the portal. By the time of the scheduled deliverable (April 30, 2004), this system was compatible with Chef 1.2 and not backward compatible with the Chef version adopted by the OGCE. To resolve this problem, we are considering a supplemental OGCE release based on Chef 1.2.

#### Findings:

In its initial year, the NMI portal development project focused on software integration and packaging, rather than on specific research issues. We anticipate research into common service abstractions and design practices to support service-based portals to be addressed in the upcoming year.

#### Training and Development:

We have been engaged in the following training activities. We include material developed after the NSF NMI award notification but before the official start date.

1. Dennis Gannon developed portal tutorial material for the 2003 International Summer School on Grid Computing. Gannon's talks are available from <http://grids.ucs.indiana.edu/ptliupages/publications/presentations/> and <http://www.extreme.indiana.edu/~gannon/>, as are a number of related presentations. For more information on the Summer School, see <http://www.dma.unina.it/~murlli/SummerSchool/>.
2. Marlon Pierce developed training and overview material for a workshop on the OGCE Portal (assisted by Marcus Christie) at NASA Ames, April 8-9. Material from the presentations is available here: <http://www.servogrid.org/slide/GEM/Ames/>.
3. Gregor von Laszewski developed a tutorial for using the Java CoG Kit for Grid application and portal development which has been used in several conferences and is distributed through <http://www.cogkit.org>.

In addition to these external training activities, our project has included the activities of several graduate and undergraduate researchers at Indiana University and the University of Chicago/Argonne National Lab. TACC, NCSA, and the University of Michigan have relied upon full-time staff positions to meet the NMI goals, providing professional development experience for junior staff members.

#### Outreach Activities:

1. Mary Thomas, 'Reusable Grid Portal Components,' GlobusWORLD 2004, January 2004, San Francisco, CA. Available from <http://www.gridport.net> (All members of team contributed).
2. Mary Thomas, 'Grid Portal Technologies,' presented to the IBM Austin Technical Vitality Council. December, 2003

3. Mary Thomas, 'Computational Grids and Portal Technologies,' presented at San Diego State University CS Dept. Emerging Technologies lecture series, March 2004.
4. Mary Thomas, 'GridPort v3: Enabling the Rapid Development of Web Services-Based Grid Portals and Applications,' presented at the San Diego Supercomputer Center, May 2004.
5. Geoffrey Fox, 'Portlets and Portals for Grid Computing,' presented at Johnson Space Center Houston February 2004.
6. Marlon Pierce, 'Component-Based Portals for Grid Computing NSF Shared Cyberinfrastructure (SCI),' presented at the Division Principal Investigators Meeting Washington February 19 2004.
7. Marlon Pierce gave a workshop on the OGCE Portal (assisted by Marcus Christie) at NASA Ames, April 8-9. Material from the presentations is available here: <http://www.servogrid.org/slide/GEM/Ames/>.
8. All OGCE participants gave coordinated demonstrations at Supercomputing 2003. Participating venue included the Argonne National Labs, NCSA, TACC, Indiana University booths.
9. Dennis Gannon has given talks on the OGCE portal at the 2003 and 2004 International Summer School on Grid Computing. Gannon's talks are available from <http://grids.ucs.indiana.edu/ptliupages/publications/presentations/> and <http://www.extreme.indiana.edu/~gannon/>, as are a number of related presentations. For more information on the Summer School, see <http://www.dma.unina.it/~murli/SummerSchool/>.
10. Charles Severance has also participated in the 2003 and 2004 International Summer Schools.
11. Charles Severance, In addition through the collaboration with the NEESgrid activity one trip (4/2004) to Japan which began a process where US and Japanese Computer Science and Earthquake researchers will work collaboratively on developing a Grid portal for Earthquake Engineering.

### **Journal Publications**

5. D. Gannon, J. Alameda, O. Chipara, M. Christie, V. Duke, L. Fang, M. Farrellee, G. Fox, S. Hampton, G. Kandaswamy, D. Kodeboyina, S. Krishnan, C. Moad, M. Pierce, B. Plale, A. Rossi, Y. Simmhan, A. Sarangi, A. Slominski, S. Shirasuna, T. Thomas., "Building Grid Portal Applications from a Web-Service Component Architecture.", Special issue of IEEE Distributed Computing on Grid Systems., p. , vol. , ( ). Accepted

### **Books or Other One-time Publications**

D. Gannon, G. Fox, M. Pierce, B. Plale, G. von Laszewski, C. Severance, J. Hardin, J. Alameda, M. Thomas, J. Boisseau, "Grid Portals: A Scientist's Access Point for Grid Services (DRAFT 1)", (2003). GGF informational paper., Submitted as a GGF informational paper.  
Bibliography: GGF informational paper.

Charlie Moad and Beth Plale, "Portal Access to Parallel Visualization of Scientific Data on the Grid", (2004). Technical report, Published  
Bibliography: Indiana University Computer Science Technical Report TR-492

### **Web/Internet Site**

**URL(s):**

<http://www.collab-ogce.org/nmi/index.jsp>

**Description:**

This is the OGCE collaborative web site.

### **Other Specific Products**

**Product Type:** Software (or netware)

**Product Description:**

The OGCE portal release includes portlets for supporting grid services, collaboration tools, and information management tools.

**Sharing Information:**

The OGCE software is available for download from <http://www.collab-ogce.org>. It includes almost everything needed to install and configure a grid portal (Java, Apache Ant, and MySQL JDBC drivers must be downloaded separately). The download is carefully packaged to install on Linux, Unix and PC platforms in a matter of minutes. It has been tested with Globus releases 2.4, 3.0, and 3.2 (including the GRIDS center R5 release).

**Contributions****Contributions within Discipline:**

Grids and Grid Portals: We have developed a downloadable, reusable, customizable Grid Portal system that is being used by other portal developers to rapidly deploy Grid portals. We have demonstrated that component-based portal systems provide an way to integrate many diverse portal projects, including collaboration portals, Grid portals, and information portals. Within these frameworks, components may be developed and improved independently of other components. We believe we have made a major step forward in eliminating 'one-time' Grid portal solutions.

**Contributions to Other Disciplines:**

As emphasized in our outreach and collaboration activities, computing Grid portals are important parts of many large scale Grid applications. Example grid applications currently or soon to be using OGCE portal software include atmospheric simulation grids (LEAD), earthquake modeling and simulation grids (NEESGrid, QuakeSim, SCEC), nuclear fusion analysis and simulation grids (the SciDAC Fusion Grid Portal). We further anticipate close interactions with the portal developers of the Collaboratory for Multiscale Chemical Science in the next year: our teams share common members and use common software bases. TeraGrid user portals, currently in their planning phases, will provide additional user interfaces to grid resources. OGCE team members (M. Thomas, G. von Laszweski, and M. Christie) lead this design effort as part of their OGCE activities.

**Contributions to Human Resource Development:**

OGCE portal software includes the building blocks for building science portals, simplifying access to Grid based resources for scientist and engineers. The relevance of this work is described in 'Contributions to Other Disciplines.'

**Contributions to Resources for Research and Education:**

Our research and development activities include both graduate and undergraduate researchers. At Indiana University, two undergraduate students and more than five graduate students have contributed in part to the current release. At Argonne Natinal Labs, Gregor von Laszewski is a co-PI on a NSF sponsored REU site on Grid Computing and Bioinformatics.

**Contributions Beyond Science and Engineering:****Special Requirements**

**Special reporting requirements:** None

**Change in Objectives or Scope:** None

**Unobligated funds:** less than 20 percent of current funds

**Animal, Human Subjects, Biohazards:** None

**Categories for which nothing is reported:**

Organizational Partners

Contributions: To Any Beyond Science and Engineering

## Year1 Goals:

The Consortium divided its deliverables into the following categories:

1. Outreach deliverables
2. Collaboratory Portal
3. A portal building toolkit
4. Programmatic deliverables and Management

The tables below map each Deliverable Category and its deliverables to the outcomes and teams that produced the deliverable. In these tables, we utilize the following lettering scheme to define the Institutions and participants:

IU	University of IU, Extreme Computing Labs, Community Grids Lab
UC	University of Chicago, Argonne National Labs
UI	University of Illinois, National Center for Supercomputing Applications
UM	University of Michigan, CHEF Project
UT	UT: Texas Advanced Computing Center

### 1. Outreach Deliverables

The project met and/or exceeded all deliverable expectations in this category.

DELIVERABLE	OUTCOME/ACTIVITY
1. Participation in UK e-Science Grid in Edinburgh, Scotland (July 2004).	The following OGCE projects were represented: <ul style="list-style-type: none"> <li>• D. Gannon (IU) "The IU Alliance Portal and the Plan for OGCE"</li> <li>• C. Severance (UM.) "NEESGrid, CHEF and the Grid"</li> <li>• E. Roberts (UT) "HotPage Portlet Development at UT"</li> <li>• T. Urban (UT) "GridPort 3.0 Plans"</li> <li>• T. Urban (UT) "The Grid Portal Information Repository (GPIR) System."</li> <li>• G. Fox and M. Pierce (IU) "Portal Components for Distributed Collaboration"</li> </ul>
2. Work within the GGF to develop an iOpen GCEi set of best practices.	The following GGF Informational Document was produced: G. Fox, M. Pierce, D. Gannon, M. Thomas, iAn Overview of Grid Computing Environments,î Global Grid Forum GFD-I.9. <a href="http://www.gridforum.org/documents/GFD">http://www.gridforum.org/documents/GFD</a> , 2003.

3. Co-author GGF/GCE white paper surveying current best portal practices and makes recommendations to the community.	The following GGF Informational Document was produced: D. Gannon, G. Fox, M. Pierce, B. Plale, G. von Laszewski, C. Severance, J. Hardin, J. Alameda, M. Thomas, J. Boisseau, "Grid Portals: A Scientist's Access Point for Grid Services (DRAFT 1)" , bibl. GGF informational paper., (2003). <i>GGF informational paper</i> . Submitted as a GGF informational paper.
4. We will work closely with GridLab and other teams on the above white paper through the GCE.	Several members of the OGCE attended GGF meetings and contributed in workshops that produced the Outreach deliverables 2 and 3. In addition teams at UT, UM, and IU have installed and tested the GridLab software.
5. Additional Outcomes	
a. tbd	tbd

## 2. Grid Portal Consortium Collaboratory (GPCC)

The project met and exceeded all deliverable expectations in this category including delivering 3 additional outcomes/deliverables.

DELIVERABLE	OUTCOME/ACTIVITY
6. Stand up an initial GPCC web site. This will be based on the CHEF version of Jetspeed with basic functional extensions derived from the Alliance Portal. The initial site's primary purpose will be to provide information about the project (1 month)	<ul style="list-style-type: none"> <li>The initial collaboratory system deployed at Argonne National labs (by SC03). See Deliverable 2.4 below.</li> <li>Collaboratory site moved to IU resources mid-year due to Argonne National Labs security challenges. IU and UC continue to support site. See Deliverable 2.5 below.</li> <li>UC continues to maintain public and internal mailing lists for the project.</li> </ul>
7. Analyze possible community solutions, analyze interoperability with GSR. Produce a whitepaper (1 month).	The following GGF Informational Document was produced: D. Gannon, G. Fox, M. Pierce, B. Plale, G. von Laszewski, C. Severance, J. Hardin, J. Alameda, M. Thomas, J. Boisseau, "Grid Portals: A Scientist's Access Point for Grid Services (DRAFT 1)" , bibl. GGF informational paper., (2003). <i>GGF informational paper</i> . Submitted as a GGF informational paper. (See also Deliverable 1.2)
8. Implement a repository based on the requirements (3 months)	UC also maintains OGCE CVS repository ( <a href="http://www.ogce.org/viewcvs/viewcvs.cgi">http://www.ogce.org/viewcvs/viewcvs.cgi</a> )
9. Initial deployment of the repository and monitor stability (4 months)	The initial collaboratory system deployed at Argonne National labs by end of September, 2003. See above (Deliverable 2.1).
10. Evaluate deployment and iteratively correct (6, 12 months)	Because of difficult installation policies at UC, the demonstration collaboratory is being run by IU University. This collaboratory is built from OGCE software and serves as a demonstration of our

	system: <a href="http://www.collab-ogce.org">http://www.collab-ogce.org</a> . UC supports this effort remotely.
11. Upgrade functionality of GPCC to include demonstration capabilities of April Toolkit deliverables.	The GPCC Portal is based on most current OGCE release (See Deliverable 3 below).
12. Additional Outcomes	
b. Portlet Information	The GPCC project reorganized the website to include snapshots and information about each portlet
c. Portlet configuration metadata	Added portlet configuration data that supports the download of different toolkit versions.
d. OGCE Portal Services	The OGCE portal download is configured to run with a number of default remote services. Several default services are provided for clients to use as part of their development and testing cycles. The current list includes GPIR, OGRE, XML Newsgroups,

### 3. Grid Portal Consortium Toolkit Deliverables

The project has met and exceeded all deliverable expectations in this category for the Initial Delivery Set. The project has completed all but one deliverable (Deliverable 3.14, IU metadata management system, which is in progress) in the Second Delivery Sets and produced 13 additional outcomes/deliverables.

Deliverable 3.14 was delayed due to outside influences: Per our SOW, the OGCE synchronizes its production releases with NMI GRID Center releases ñ R5 was scheduled for early May. By the time of the scheduled deliverable (April 30, 2004), the IU metadata system was in production and compatible with Chef 1.2, which is not backward compatible with the Chef version adopted by the OGCE. To resolve this problem, we are considering a supplemental OGCE release based on Chef 1.2.

DELIVERABLE	OUTCOME/ACTIVITY
<b>Initial Delivery Set</b>	
1. Basic Portal Capabilities:	Supercomputing 2003 Beta release
a. We will provide a Jetspeed container for all OGCE capabilities.	The beta release utilized the CHEF Framework from NEESGrid project, which is Jetspeed 1.
b. Standard Jetspeed capabilities for configuration, customization.	CHEF Framework utilizes these features. In addition, modifications to the login process allows OGCE toolkit to use a GSI authentication session proxy for the lifetime of the session (UM, UT).
c. MyProxy-based secure authentication	The portal uses GSI authentication with a portlet that pulls a proxy from a MyProxy server. (IU)
d. Individual and group portal capabilities (teamlets)	These are expanded upon in Deliverables 3.2 ñ 3.7
2. Collaboration Portal Services and User Interfaces (UM and IU)	
a. Discussion boards,	Discussion boards, announcements, chat and

announcements, chat and instant messaging (UM)	messaging portlets, calendar tools. These were delivered by UM along with the Chef 1.0.7 framework that we used as the portal container. These use an internal (to the portal) event system. This release also includes basic group sharing capabilities for these tools and the ability to create group spaces in the portal.
b. Calendar tools (UM)	See Deliverable 2.3 above.
c. Newsgroups and shared citation/reference management (IU)	Newsgroup and citation browser portlets, developed and integrated by IU. These were coupled to external services that are included in a supplemental release.
d. Event-based communication services (UM,IU)	Collaborative tools use an internal event system (IU, UM)
3. Remote File Management Interfaces and Services (UM, IU, UT).	Both the GridPort Toolkit and the JavaCoG toolkit provide middleware services and APIs that the portlets can utilize. These toolkits provide bridges to remote services such as GT2 and GT3. (UC, UT).
4. Grid information and monitoring services browsing portlets (IU, UT) for accessing GRIS/GIIS.	Grid Information and Monitoring services, including LDAP/GRIS/GIIS portlet interfaces (IU) and GPIR v0.9 portlet interfaces (UT).
5. Portlet interface to MyProxy through Java CoG, supplementing initial login (UC, IU).	See Deliverable 3.1.c. COG developments during this period included an upgrade of the security libraries.
6. Portlet interfaces to GridFTP through Java CoG for remote file management (UC, IU, UT).	Remote file management portlets: these included the GridFTP interface of IU and the WebDAV-based document system of UM. The UT GridFTP portlet was deemed to be redundant with the IU interface, so UT focused on additional deliverables (below).
7. Initial Grid Portal Information Repository software (UT).	The GPIR initial release (GPIR 0.9) points to UT resources for demonstration in this release. Full GPIR support is included in the May release.
<b>Second delivery set</b>	<b>Synchronized with NMI R5 GRIDS Release, May 2004.</b>
8. GT3 Compatible Application Manager Web Service (AMWS): this a dynamically launched workflow engine for managing complex scientific jobs.	IU developed the Open Grid Run-time Environment (OGRE) workflow system. This was renamed from the Application Manager Web Service in the cooperative agreement. The OGRE system is available for download and extensively documented as part of this deliverable.
9. Sample application to demonstrate AMWS capabilities, including input file staging, batch job execution, and result archiving	OGRE client portlets and a sample application for interacting with the IU OGRE system for managing applications. Deployed to the Modeling Environments for Atmospheric Discovery (MEAD) (Alliance Expedition, leads Bob Wilhelmson and Sara Graves) and Linked Environments for Atmospheric Discovery (LEAD) (ITR, lead Kelvin Droegemier) Projects.
10. Science application tools with user interface portlets. Toolset will	IU developed interfaces to the XDirectory system, called GridContext in this portal release. The

include XCAT application factory, XEvents/XMessages, XDirectory, and XBooks (IU).	XDirectory server side was packaged as a separate download and is available through the OGCE website. The GridContext system, in addition to serving as a general purpose notebook, acts as an interface to the application factory services, allowing users to launch jobs, browse results posted via XEvents, and interact with applets. This deliverable was actually included in the SC release.
11. Sample earthquake simulation code portlets (IU)	The sample earthquake simulation portlets were replaced with a more generalized application wizard in the May version (IU). IU worked with IU to provide an earthquake simulation workflow for the default OGRE example.
12. Metadata repository reference user interface and server side (IU): In Progress.	Deliverable 3.14 was delayed due to outside influences: Per our SOW, the OGCE synchronizes its production releases with NMI GRID Center releases. R5 was scheduled for early May. By the time of the scheduled deliverable (April 30, 2004), the IU metadata system was in production and compatible with Chef 1.2, which is not backward compatible with the Chef version adopted by the OGCE. To resolve this problem, we are considering a supplemental OGCE release based on Chef 1.2. (IU, UM)
13. GT3.0 compatible Grid Portal Information Repository (UT) (demonstrated across large systems such as TeraGrid)	UT released a production version of the GridPort v3 Toolkit, which is based on GT3. This included a GPIR v1.0, which also has a web based admin form. GPIR is deployed across NPACI grid and plans for TeraGrid deployment are underway. (UT)
14. Additional Outcomes	
a. Grid Application Portals	Although not a deliverable for Year 1, the OGCE Toolkit is already in production use, and has been adopted (or plans are underway) by several large grid projects, including: <ul style="list-style-type: none"> <li>• TeraGrid User Portal (UT, IU)</li> <li>• LEAD Portal (IU, IU)</li> <li>• MEAD Portal (IU)</li> <li>• DOE Fusion Portal (UT, IU)</li> <li>• SCEC Portal (UT working with SDSC)</li> <li>• Cosmic Web Portal (IU, UT, planned)</li> <li>• NEESGrid Portal (UM, IU)</li> <li>• NMI Testbed Portal (UT/SURA)</li> <li>• UT User Portal v3.0 (UT)</li> <li>• Others</li> </ul>
b. Application Manager Portlets	IU also included application manager portlets that demonstrate how to manage application information and integrate this into an integrated set of portlets that combine GRAM job submission and GridFTP interfaces.
c. JSP compatible portlet type	IU developed a JSP compatible portlet type that can be used in place of the normal Velocity-based portlet

	tools used by the other portlets. This can be used to integrate pre-existing JSP web pages into the OGCE environment. JSP and Velocity portlet development documents are available through the portal collaborative website.
d. Newsgroup system services	Newsgroup that is hosted external to the portal.
e. OGRE server-side tools	IU is developing metadata-management tasks, based on a client to a web-service currently being elaborated in conjunction with the LEAD project.
f. XDirectory Grid Service	(the backend of the GridContext portlet).
g. GridPort 3 Community Scheduling Framework Job Submit Portlet	UT included portlets and services (via the GridPort 3 Toolkit) for interfacing with Community Scheduling Framework services. CSF is a GT3 interface for accessing generic job schedulers, developed by Platform Computing through the GGF and freely available.
h. GridPort 3 Job Sequencer Portlet	UT developed a job scheduling system, with portlet interfaces, that can be used to set up multi-staged jobs across several grid hosts.
i. Grid Credential Login	UT developed and integrated a portal login system based on local Grid credentials rather than remote MyProxy credentials. This is set up as an optional build parameter. Use of this build allows clients to utilize the GP3 Credential repository and/or a MyProxy server for login.
j. MyProxy-based login system.	IU and UM developed a MyProxy-based login system: if you choose this build option, your portal login and password will be mapped to a MyProxy client authentication.
k. CoG Workflow portlets	The UCteam developed workflow portlets on top of the COG kit.
l. Condor Portlets:	Portlets allow you to submit and monitor jobs through Condor.
m. Single sign-on Investigations	The OGCE team investigated the use of alternative single sign-on technologies for the portal. The UM group has, in collaboration with the MGrid activities and CITI at the University of Michigan, investigated the use of KX.505 credentials as a single sign-on mechanism for the OGCE portal. This sign-on mechanism combines Kerberos and PKI that bridges Kerberos authentication with browser-compatible PKI certificates. KX.509 and mod_kx509 need to be improved to be made more general and simpler to install. Also, PKI certificate trust chains are complex to maintain. Initial support for KX.509 was included in the second release of OGCE. More work is needed before this is simple to use. The support will be improved in the next release of OGCE.

#### 4. Programmatic/Managerial Deliverables

DELIVERABLE	OUTCOME/ACTIVITY
1. Software design guidelines: style conventions, documentation requirements, and design reviews	The OGCE team held an all-hands developer meeting in April and began the process of setting standards for coding and directory structure. Many of the plans were implemented in the May release.
2. Testing and evaluation guidelines and technologies: will cover unit, integration, and system testing	Testing and evaluation guidelines were set at the April developers meeting. See deliverable 4.1 above.
3. Repository management guidelines	The OGCE uses a CVS repository for software versioning control and upload reporting. Additional guidelines were set at the April developers meeting. See deliverable 4.1 above.
4. External oversight committee members	
5. Meetings	13. OGCE holds weekly telcons, where all members participate. 14. Several OGCE meetings were held this year: 15. Grid Portal Consortium PI kickoff meeting May 27-28 to finalize these plans. 16. OGCE Developers meeting, April 2004. 17. In addition, the OGCE PIs and developers held meetings where possible: 18. SC03, Nov 04 19. GlobusWORLD, Jan 04 20. DOE Portals meeting, Feb 04 21. NSF Sci PI, Feb 04 22. GGF10, Mar04 23. DOE SciDAC PI meeting, Feb04 24. GGF11/HPDC, Hawaii, Jun04

## NMI OGCE YEAR 2 SOW

### *Deliverables Plan*

In Year 2, our primary technical objectives will be a) porting Year 1 portlet software to the new portlet standard, JSR 168, b) developing and implementing common Grid portlet APIs, and c) developing advanced portlet capabilities, listed below. Efforts a) and b) will be group deliverables, while c) will mostly involve efforts at individual institutions. We will again schedule two major releases: one for Supercomputing 2004 and one for May 1, 2005. We will also provide supplemental software releases as necessary.

The OGCE is intended to serve as an open consortium that can include external contributions. During the second year, we will work closely with selected communities to integrate externally developed tools and (more importantly) specify the

contribution/integration process for third party software. Specific deliverables will include the integration of externally developed portal capabilities from NEESGrid, CMCS, and the Fusion Grid Portal projects into the OGCE release. We will also work with these groups to forward port their software to JSR 168 compatible versions. We also anticipate supporting many additional, highly visible NSF portal efforts, particularly TeraGrid and the LEAD portal.

Programmatic deliverables for this year will be closer integration of the portal build and test process with the GRIDS center testbed. This integration will involve automated build and report systems, but also we will develop (using HTTPUnit) an extensive set of portal tests that will be able to verify both the functionality of the portal and also the underlying Grid software.

### ***Supporting Collaborative Communities***

1. We will continue to participate in the TeraGrid User Portal design and development efforts. Mary Thomas is the primary liaison from the OGCE team, with assistance from TACC, IU, NCSA, and ANL team members. An initial demonstration portal will be shown at SC2004, with upgrades through the year. A detailed User Portal Plan document has been written and is available. TACC has been chosen as the host site for the TeraGrid User Portal.
2. We will integrate selected NEESGrid and CMCS capabilities into the OGCE release. We will work with these two groups to adopt additional OGCE capabilities.
3. We will participate in the DOE SciDAC program's Portals Consortium. This is a newly formed, volunteer consortium of DOE project PIs from TACC, IU, ANL, and Lawrence Berkley National Lab. This consortium's goal is to coordinate portal develop efforts within the SciDAC program, using the OGCE portal release as a baseline.

### ***Software Deliverables***

#### **Global Deliverables**

These are team efforts and will involve all OGCE team members.

1. Migration portlets to support JSR 168 container compatibility. We will demonstrate, and have an initial release, of JSR 168 compatible portlets available for SC2004. These will focus on Grid portlets (credential management, GridFTP, GRAM, etc.)
2. A fully JSR 168 compatible release will be available in the May 2005 release. This will include all major OGCE portlets. We will demonstrate container independence: our portlet releases will be able to run in most/all major JSR 168 containers.
3. We will identify and implement necessary portal container services for implementing fully interoperable JSR 168 grid portlets. JSR 168 portlets have a standard API that can be invoked by the container, but there is not yet a standard API for the reverse operation (invoking services provided by the portal container

from within a portlet). We will work with the appropriate communities (primarily the Sakai and GridSphere developers) to identify these services.

4. Portal support for GT4 services and WSRF. This will be delivered in May 2005.
5. We will develop and implement a generic Grid Portal API for all major portal foundation services: authentication, file transfer/management, persistence, etc. This will simplify the development of third party Grid portlets that can be plugged into the OGCE framework. We will work through the Global Grid Forum's SAGA Research Group to make sure that our efforts will be compatible with the larger Grid application development community. This effort will be lead by ANL and TACC, but will involve all participants.

### **Local Deliverables: IU**

1. We will deliver portlets and services for audio/video collaboration. These portlets will include AV session management portlets as well as AV clients. We will include portlets and services that can be used to participate in Access Grid sessions over unicast (rather than multicast) networks. We will also include portlet clients capable of connecting to H.323/Polycom sessions. This will be included in the Supercomputing release.
2. We will develop general purpose portlets and services to support Geographic Information Systems. GIS clients and services are widely used by government agencies for planning and emergency preparedness/homeland defense, so these capabilities will broaden the OGCE portal appeal. For Supercomputing 2004, we will develop versions of GIS Web Feature and Web Map services, along with Web Map clients. For the May release, we will include additional GIS services.
3. We will develop a secure version of the Application Factory Service that can be used to wrap legacy science applications in launch them through the portal. This will be integrated with the NCSA OGRE system and (through the general WS-Notification interface) the IU NaradaBrokering system. These will be initially demonstrated at Supercomputing 2004, with upgrades for the May release.
4. We will develop data grid portlets and services based on the OGSA-DAI or similar services. This will include an initial release for SC2004, with upgrades for the May release.

### **Local Deliverables: TACC**

1. Infrastructure:
  - a. Development of OGCE Interfaces and Patterns (Working directly with Argonne)
  - b. GridPort Toolkit implementing OGCE Interfaces and supporting OGCE API
2. Portlets and services:
  - a. Storage Resource Broker (SRB): working with SDSC team to create portlets and web services for SRB.
  - b. TACC User Portal (TUP) bundle: will deliver portlets used for a HotPage portal

- c. GPIR: additional features and capabilities including ability to store key CoG objects (Task, Execution, etc.). TACC working with Argonne on this deliverable
  - d. Portal account creation and management portlets, including session to session persistence via GPIR
  - e. Pegasus Workflow Portlets ñ TACC working with ISI to integrate Pegasus into GP3 and OGCE
3. Portals (in progress or planned):
- a. TeraGrid User Portal ñ TACC and IU collaborating
  - b. TACC Molecular Dynamics Portal: will deliver portlets for the following MD applications: NAMD, AMBER, and GROMOCS. Also evaluating potential bioinformatics applications portals.
  - c. DOE Fusion portal
  - d. CMCS Portal (PNNL): TACC working with Argonne (PI) to support DOE portal development
  - e. TACC developing TACC User Portal, UT Grid User Portal, and TIGRE User Portals based on OGCE software

### **Local Deliverables: UMich**

- 1. Infrastructure
  - Liaison with Sakai Project and uPortal Projects
  - Continued support for KX.509 as a single sign on mechanism
  - Investigate the integration of Shibboleth, the Grid, and the portal
  - Integrate Grid into Sakai release
- 2. Portlets and Services
  - Accounting and job submission portlets
- 3. Portals (in progress or planned)
  - NEESGrid Portal - Convert to OGCE Current version once it is released. Available for SC04

### **Local Deliverables: NCSA**

- 1. Grid Desktop Graphical User Interface
  - a. Supporting simple job launches
  - b. Service client to portal services
- 2. Extend sample application to show more data elements
  - a. Parameters
  - b. Linear composition
  - c. Others as derived from application collaborators on other projects
- 3. Portlet client/NEESgrid metadata repository
  - a. Integration of replica service into the Open GCE Runtime Engine (OGRE).

### **Local Deliverables: University of Chicago**

#### **A. First Quarter FY2**

- 1. Adapt the deliverables of the project dependent on the timelines and deliverables used in future Globus Toolkit releases with the focus on GT4

2. Assist in the move of the Web site to Indiana University
3. Assist in the move of the Code repository to Indiana University.
4. Provide a direct port of Condor services within the Java CoG Kit allowing the development of Condor style job submissions directly through the Java CoG Kit.
5. Improve the Workflow portlet backend service
6. Provide a port of the Java CoG Kit for GT4
7. Continue the support of GT2.4
8. Support for future Globus toolkit versions

#### B. Second Quarter FY2

1. Development of a File Access mechanism as part of the Java CoG Kit.
2. Development of a Portlet to conduct File access based on item 1.
3. Development of a prototype of a Grid Command manager that can be started through Webstart within the portal and is used to manage many user controlled jobs.
4. Support for future Globus toolkit versions

#### C. Third Quarter FY2

1. Improvement of the workflow services while using the newest service oriented Grid technologies.
2. Support of WebDAV in the File access component as part of the Java CoG Kit.
3. Development of a Portlet to the Simple CA to allow other communities to more easily run their own certificate authority.

#### D. Fourth Quarter FY2

1. Showcase the functioning workflow service while using existing Globus and Condor hosting environments.
2. Investigate the possible integration of smart cards and other external devices as part of the security integration within the portal.
3. Assist the GGF SAGA working group in formulating documents for a simplified API to the Grid.
4. Support for future Globus toolkit versions

### ***Outreach Deliverables***

We will continue to participate in the major Grid community

1. Demonstrations at Supercomputing 2004 to coincide with release.
2. Presentations at GlobusWorld
3. Participation in Global Grid Forums

We will also organize a Grid Portal tutorial.