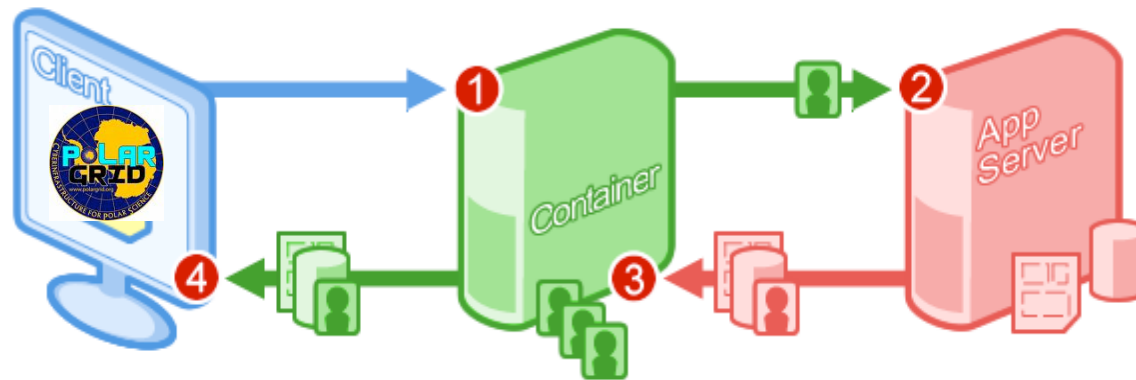# Building Polargrid Portal using Gadgets and OpenSocial

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Introduction to Polargrid

- An NSF-funded MRI project that provides computing support for the Center for the Remote Sensing of Ice Sheets (CReSIS, https://www.cresis.ku.edu/)

- CReSIS is primarily concerned with using Synthetic Aperture Radar (SAR) techniques to obtain information on the depth of the Greenland and Antarctic ice sheets and their underlying rock beds.

- Provides both in-the-field computing clusters for initial image processing and larger clusters at Indiana University for full-scale image processing.

- Image processing is needed to produce data products of multiple levels

Partners & Collaborators

- Jeff Woods at ECSU

- University of Kansas

- Ohio State University

- Pennsylvania State University

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Portal Requirements

- View CReSIS data sets, run filters, and view results through Web map interfaces.

- See/Share user's events in a Calendar.

- Update results to a common repository with appropriate access controls.

- Post the status of computational experiments.

- Support collaboration and information exchange by interfacing to blogs and discussion area.
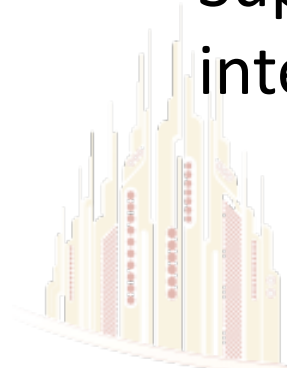
Approaches

- Existing frameworks like Sakai, Moodle, Liferay, Exo and Drupal

- Building open system using OpenSocial Gadget and using Google services or social network services like Facebook, Twitter etc. for collaboration

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Technologies

Tech/Design choices	Reason Summary
Web 2.0	Improves usability and responsiveness
Gadget	Makes developers possible to write reusable web components that can be deployed to any Gadget container.
OpenSocial	Makes portal possible to interact with existing large social networks instead of building our own.
REST	Makes applications able to access PolarGrid services using simple HTTP requests.
OpenID	Makes portal able to interact with external OpenID-compliant identity management systems.
OAuth	Makes portal able to interact with external OAuth-protected services.
MyProxy	Makes portal able to interact with security infrastructure of Grid systems.

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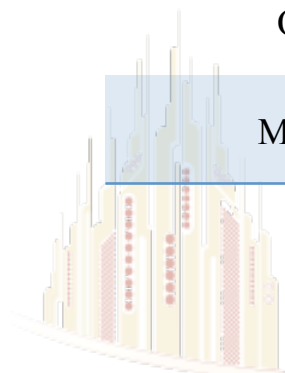
Polargrid Architecture
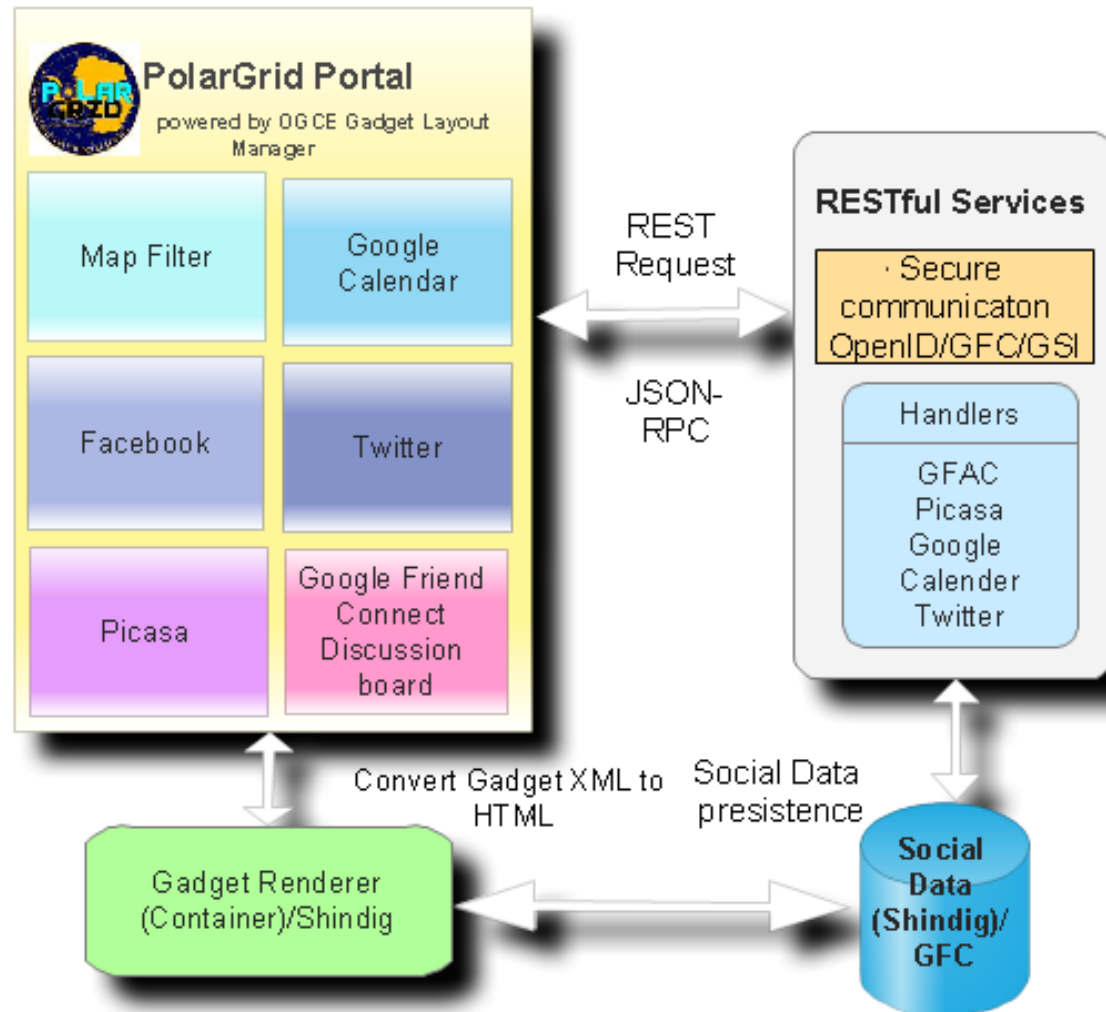
Process Flow

1. A user visits his/her gadget home page, which is served by OGCE gadget layout manager

2. The gadget layout manager constructs the user's custom gadget layout in browser and makes use of a gadget renderer (Shindig in our case) to render each gadget XML to HTML/JavaScript. Then the generated HTML/JavaScript code is displayed in browser.

3. Different gadgets may interact with different backend RESTful services to generate output. A JSON response is sent back to the gadget to display the results.

4. Gadgets and RESTful services also query social data using OpenSocial API's by sending requests to Shindig server.

Gadgets

Filter Gadget	User can select different parameters to run a filter to create image. Result image will be displayed on Google map.
Blog Gadget	To display the feeds from PolarGrid blog site.
Discussion Board	Google Friend Connect (GFC) gadget to discuss on certain topic.
Filter Images	Picasa gadget to display all the filter images with filter description.
FAQ Gadget	GFC gadget for Question/Answer. Moderator can always control the topics and can block people from the list.
Google Calendar	Calendar gadget to display public PolarGrid-specific activities and tasks.
Twitter Gadget	To read filter execution updates from twitter related to PolarGrid.
Facebook Gadget	User can update status of task directly to Facebook from here.

Backend services

- REST service
  a. To integrate gadget with GFAC service.
  b. Call GFAC Webservice and read the SOAP response to read result.
  c. Upload resultant image to Picasa with parameters information.
  d. Add this activity to the calendar under particulate calendar name.
  e. Publish this activity along with Picasa URL and Calendar event to Twitter
  f. Create JSON response for Gadget
- GFAC Service is to wrap the service request and establish communication with Teragrid resources to run the Matlab job.
- Matlab filter: Binary takes all the parameters and process the filters for required data set.

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OGCE Gadget Portal

- Goal
  - Build an open, lightweight, flexible, easy-to-build, general portal

- Approach
  - Agile development: make use of existing and widely-accepted technologies and services.
    - Web 2.0, Gadget, OpenSocial, OpenID, OAuth
    - Google Calendar, Picasa, Blogspot, Twitter
    - TeraGrid
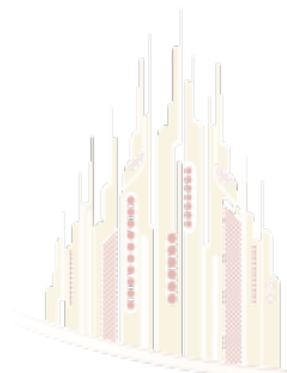
PolarGrid Architecture
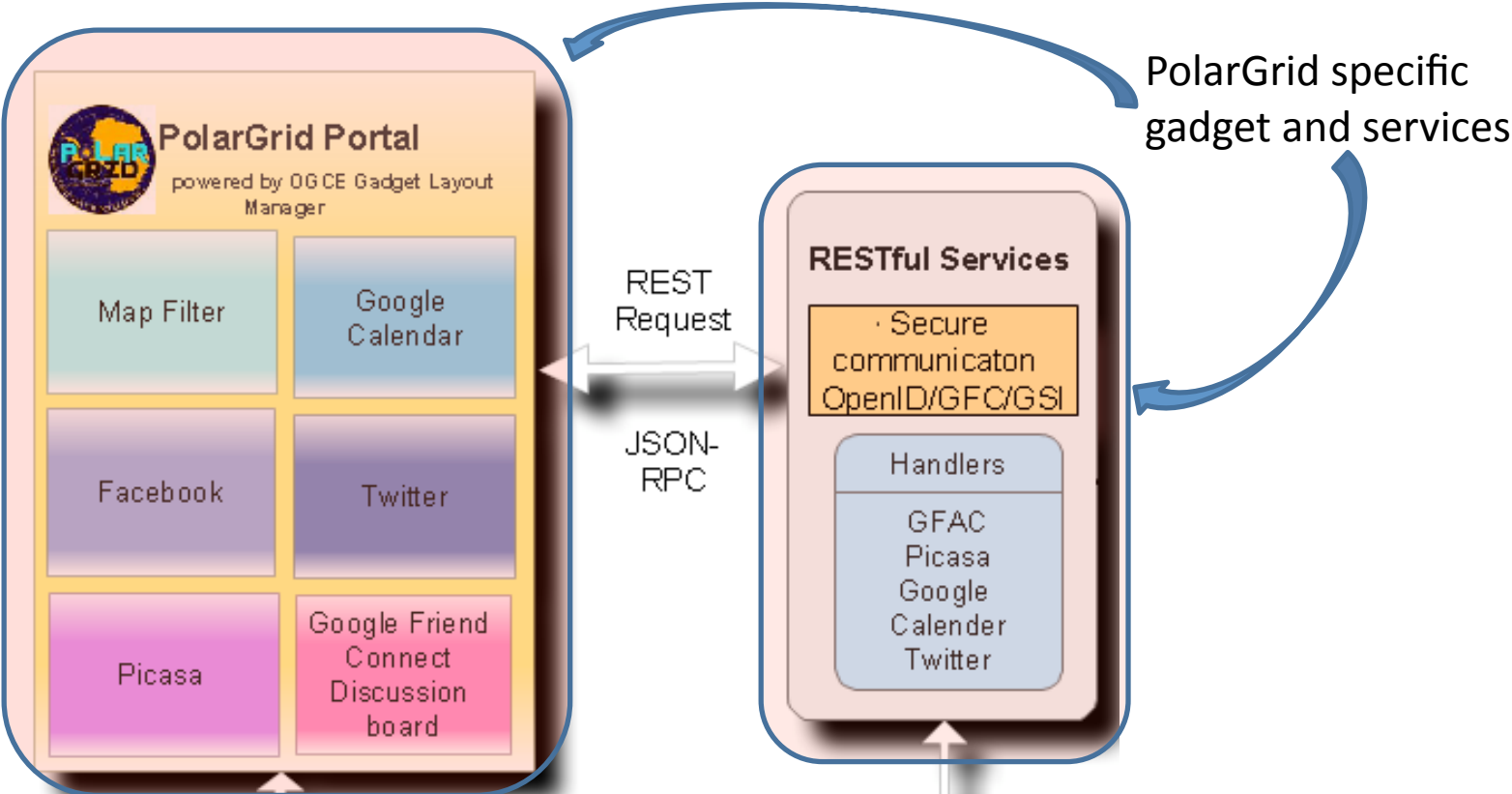
Web 2.0

"Second generation of web development and web design"

Enterprise Approach	Web 2.0 Approach
Portlets	Gadgets, Widgets
SOAP	RSS, Atom, JSON
WSDL	REST(GET, PUT, POST ,DELETE)
Server side integration	Client-side integration (AJAX)
Monolithic Workflow managers	Mash-ups (e.g. Yahoo Pipes)
Gateways	User-centric social network portals

REST

- Uniform interfaces based on HTTP
- Resource-oriented (resource can be anything)
- Each resource is identified by a unique URL
- State transition (Link resources together)
- Resources have multiple representations (JSON,XML)
- **Good for both browser-to-server and server-to-server interactions**
- Alternative - SOAP-based WS
  - About 60 core ws-* protocols
  - Designed for server-server interactions
    - SOAP and WSDL are really complicated
    - Browser-based apps are second-class citizens.

OpenSocial

- A coherent open architecture designed for social network services and applications.

Components

- Interface : REST, Javascript APIs
- Client : Ajax, Gadget
- Message Format : JSON, XML
- Security : OAuth
- Data Model
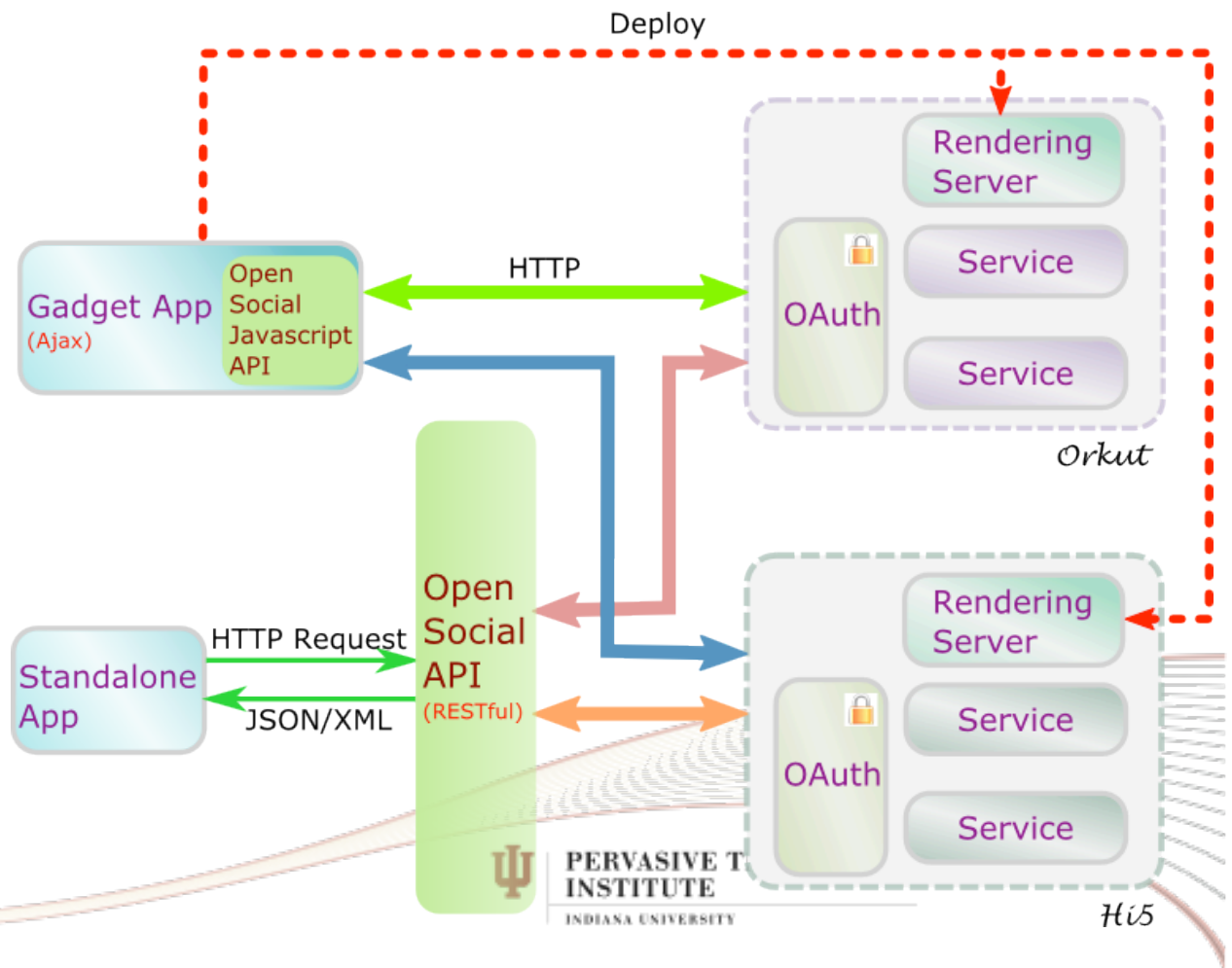
OpenID

- Separation of Identity Provider and Relying Parties.

Google Blogspot
Yahoo!
Flickr
AOL

OGCE Gadget Portal
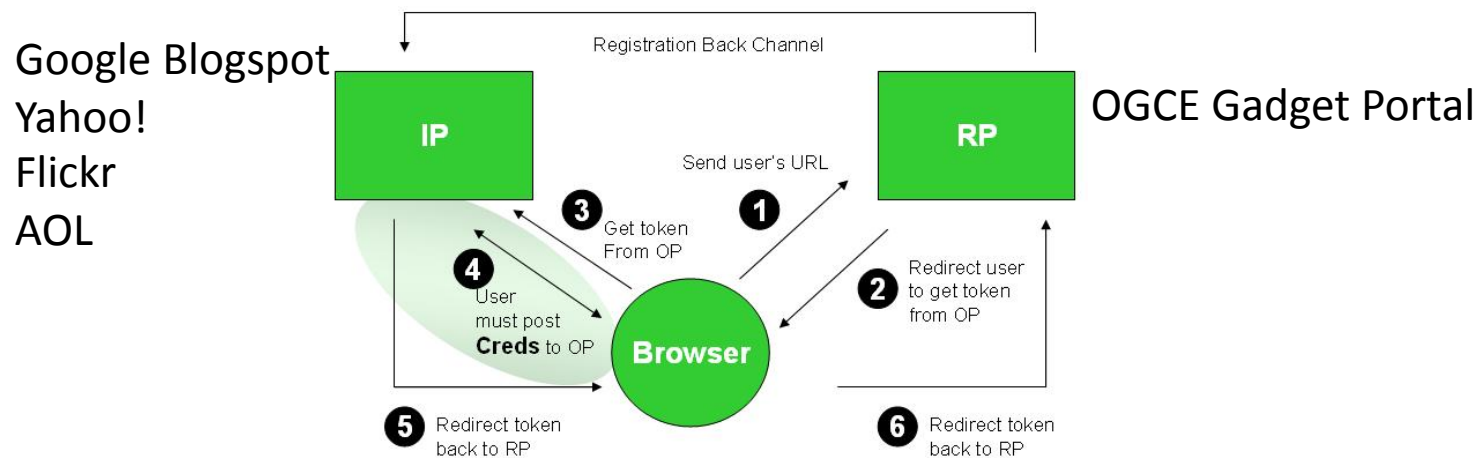
- Identity Providers: Blogspot, Flickr,
- Use the same OpenID to log in multiple sites.
- Bind OpenID to local accounts.
- After the binding, use OpenID for login.

Google Friend Connect

- Novel way to integrate Social Features
- Allow users to login with existing Google, Yahoo, AOL, OpenID accounts

OAuth

- Users' data is served at service providers.
- Third party apps want to access users' data.
- Users don't need to relinquish username and password to third party apps.

3rd-party App ⟶ Twitter

Google Docs
MySpace
Twitter
SmugMug

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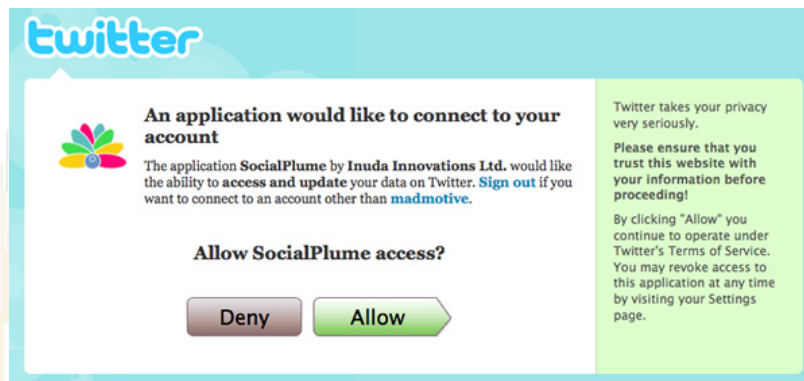
OAuth (cont.)

- Drawbacks
  - V1.0 is vulnerable to session fixation attack (http://oauth.net/advisories/2009-1). Fixed in v1.0a.
  - Delegation granularity (Service provider-specific)
    - Operations
    - Data
  - Access token management
    - Non-standard
    - Expiration (implicit timeout)
    - Revocation (explicitly revoke assigned privileges)

Tab layout

Tree Layout

OGCE Gadget Portal Features

- Two layouts
  - Tab
  - Tree
- Gadget group manipulation – add/remove
- Four built-in themes
- Gadget manipulation
  - Add/remove Gadget
  - Drag and Drop
  - Two gadget views: home and canvas
  - Gadget setting
- Session persistence
- Layout data
  - View, modify layout data
  - Easy to migrate when you do a new installation
  - Inspect
- On demand rendering
- Customization

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Gadget Resource

- Reusability
- Google gadget directory contains about 180,000 gadgets.
- They can be deployed to OGCE gadget portal.
- Common gadgets
  - RSS Feed Reader, Calendar, Email, Task list
- Social gadgets
  - Twitter, Google Talk, Facebook, Youtube

Other Science Use Cases

- TeraGrid
  - MiniGpir, load monitoring, resource usage
- Open Life Science Gateway
  - Use OAuth to submit jobs and access resources
- Cyberaide
  - Interact with Grid using web interface
    - MyProxy authentication
    - Globus Job Submission
    - GridFTP file transfer
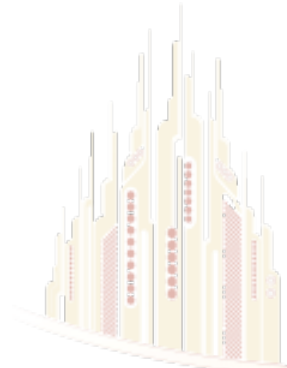
OGCE Software's and Related links

OGCE Layout Manager: This project is to provide Open Social-compatible gadget layout container and gadget host server.

- Actively Developed by Gerald Guo, PHD student in Indiana University
- Gadget Develops need not to depend on igoogle or orkut
- Lot of new feature are added lately and several new in a queue.

GFAC: Wrap any command-line application as an Webservice.

- Developed for Lead Project and now generalized for any gateway.
- Rearchitected to work as Axis 2 service to leverage handler architecture and REST support.

Publications and related research

- Building the PolarGrid Portal Using Web 2.0 and OpenSocial GCE09 Grid Computing Environments 2009 workshop at SC09 Portland Oregon November 20 2009
- http://www.collab-ogce.org
- http://collab-ogce.blogspot.com/
- http://cglreport.zhenhua.info/
- http://communitygrids-raman.blogspot.com/2009/07/open-social-frameworks_20.html

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