UCLA

Academic Technology Services

The Integration of AJAX, Interactive X Windows Applications and Application Input Generation into the UCLA Grid Portal

SC07-GCE07

UGP Documentation at:
http://www.ucgrid.org

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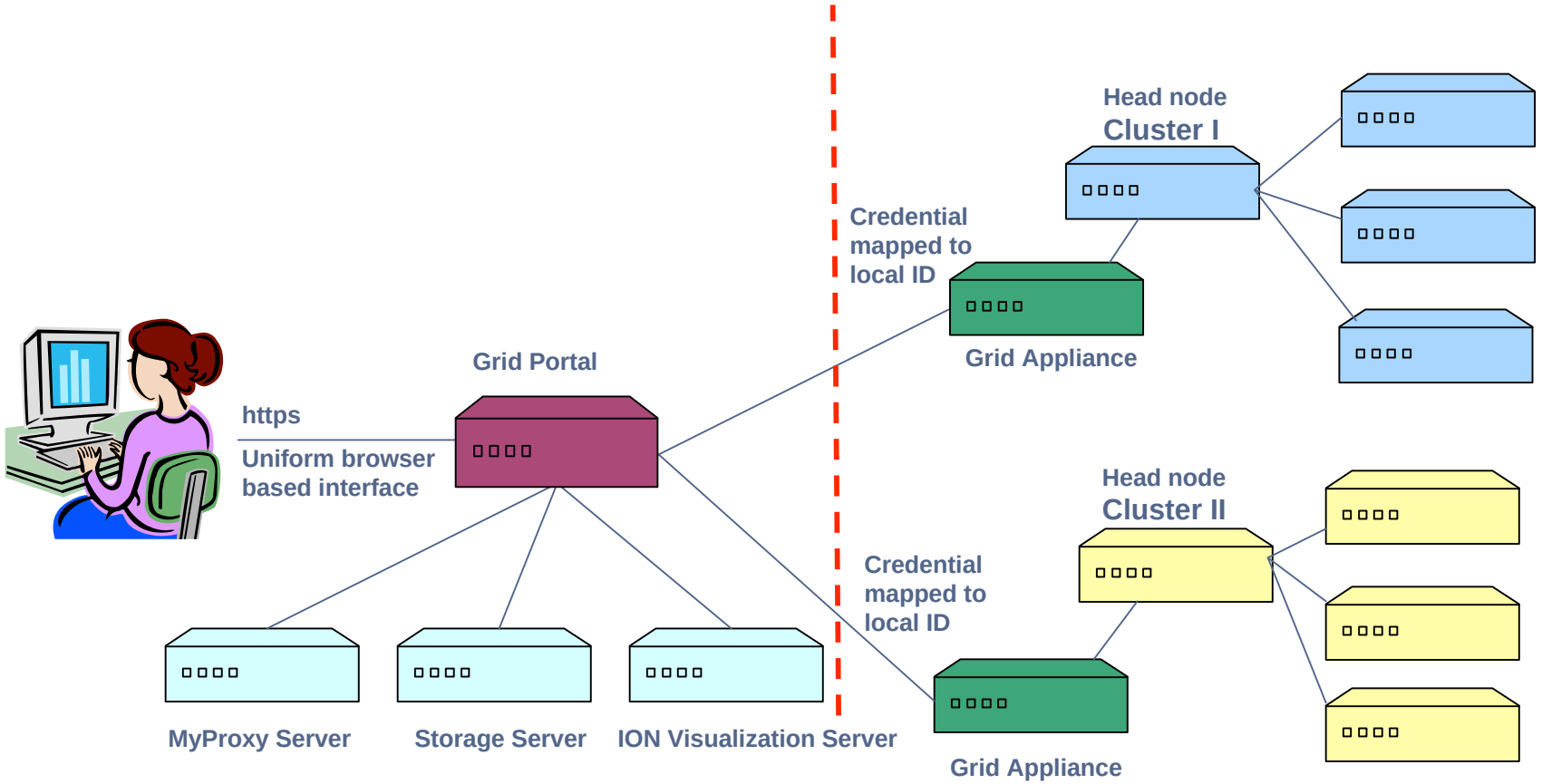
UGP (UCLA Grid Portal)

- Joins computational clusters into a Grid
- Services Provided
  - Resource Discovery
  - Data Manager
  - Batch Job Submittal/Status/Output
  - Interactive GUI applications (run on the clusters)
  - Grid Development Environment
- Simple Identity Management Interface

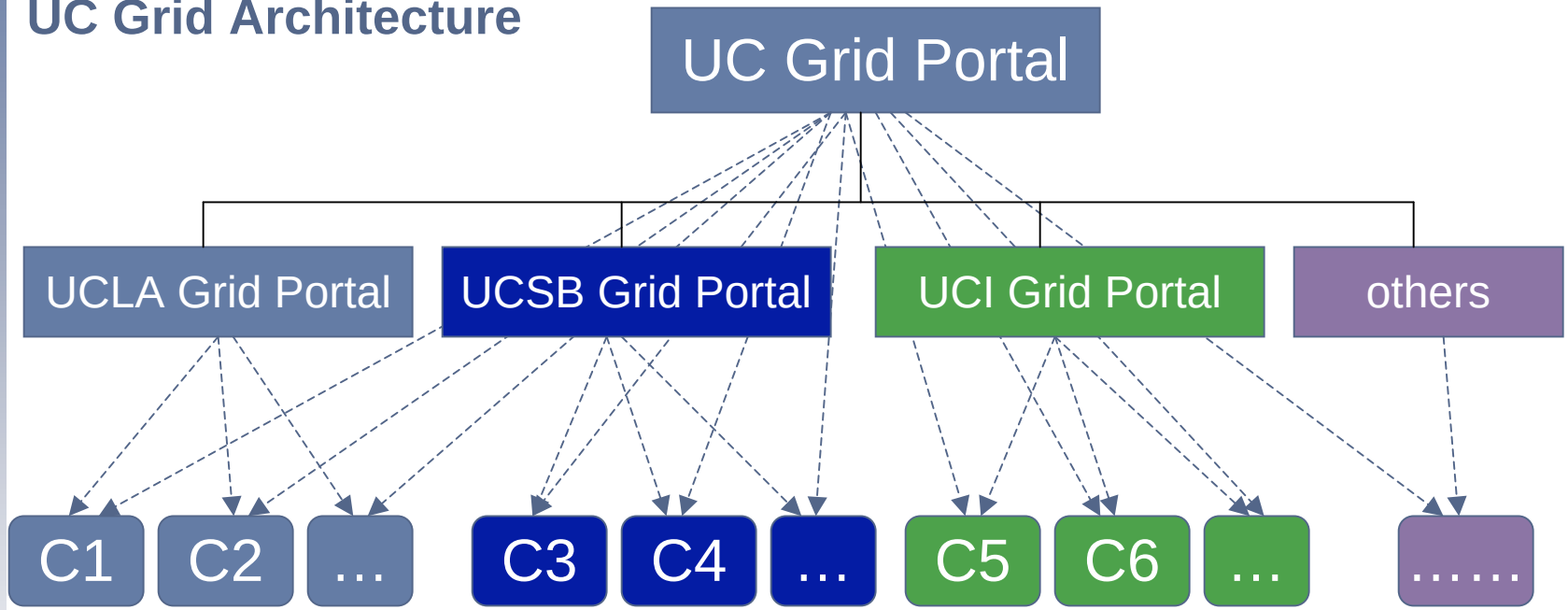
UGP (UCLA Grid Portal)

- Under development at UCLA since 2002.
- Web Portal built on top of:
  - Globus Toolkit 4.n -- Tomcat
  - MySQL -- Shibboleth
  - GridSphere Portlet Framework
- AJAX based interfaces built on top of the following toolkits:
  - Zimbra AJAX Toolkit
  - YUI (Yahoo User Interface)
  - GWT (Google Web Toolkit)

Single Campus Architecture



UC Grid Architecture



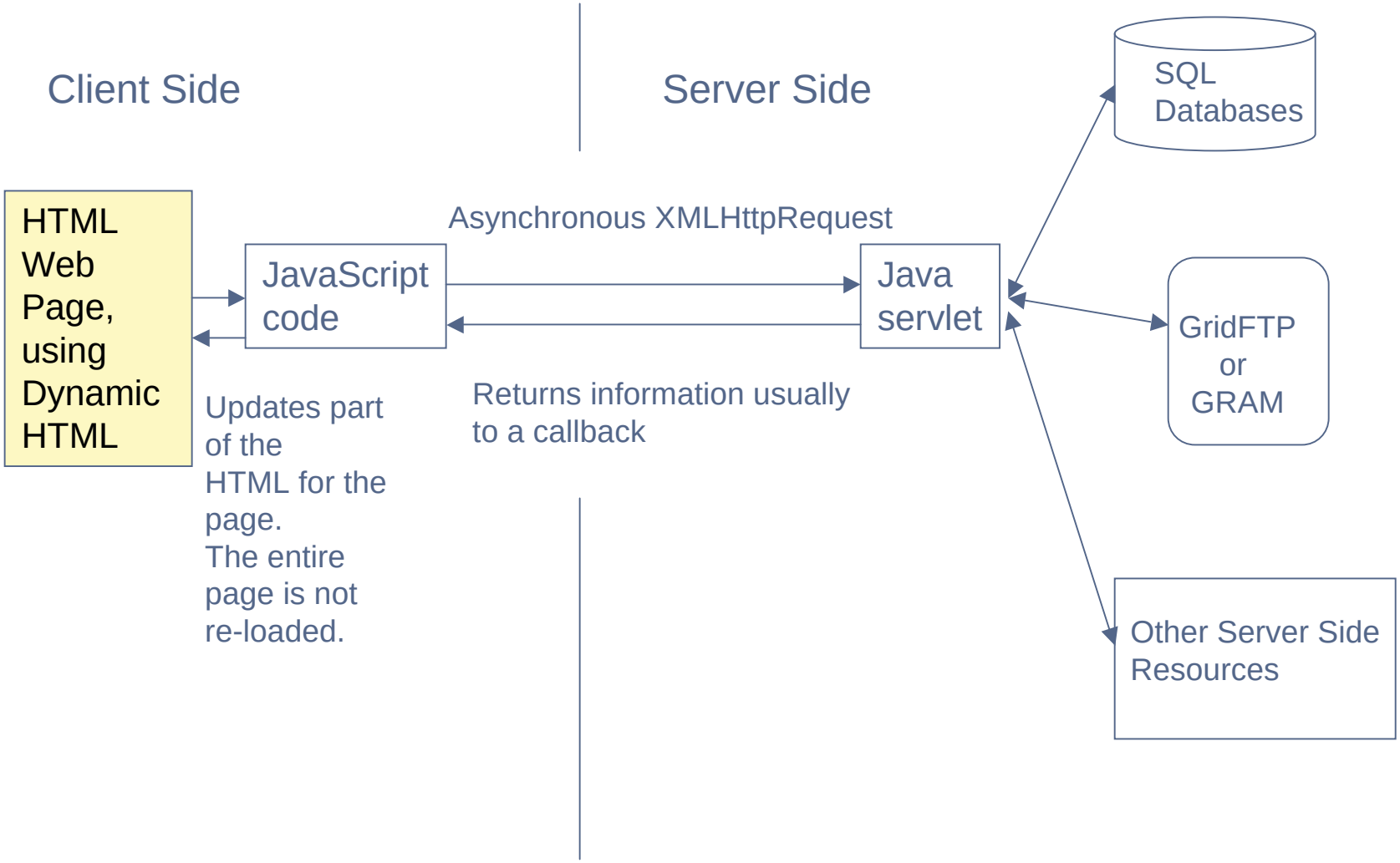
- User always applies from Campus Portal
- One Certificate Authority(CA) throughout UC Grid
- User CA is automatically created and pushed to myproxy server
- Simple account creation process (approval/denial workflow)
- Once the admin approves, the user is able to login to two portals instantly
- **Enabled by Register Web Service and Sync Web Service in UC Grid Portal**

Conventional Web Interfaces vs. AJAX Enabled User interfaces

AJAX

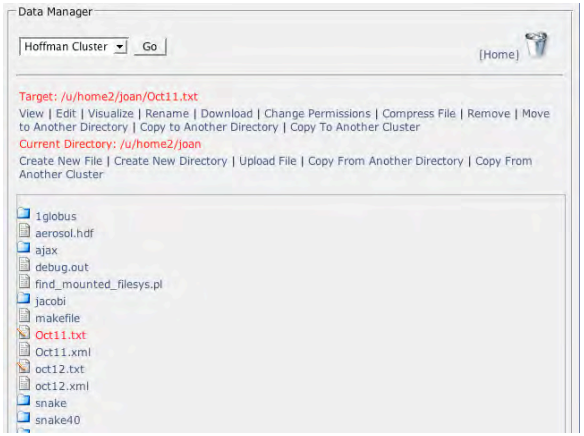
- AJAX = asynchronous JavaScript and XML
- JavaScript runs in the Browser
- Java code on the server processes the requests
- Asynchronous XMLHttpRequests used for communication
- Only part of the Web page is updated
- Interactivity gains and efficiency benefits (fewer clicks required)

How AJAX Works

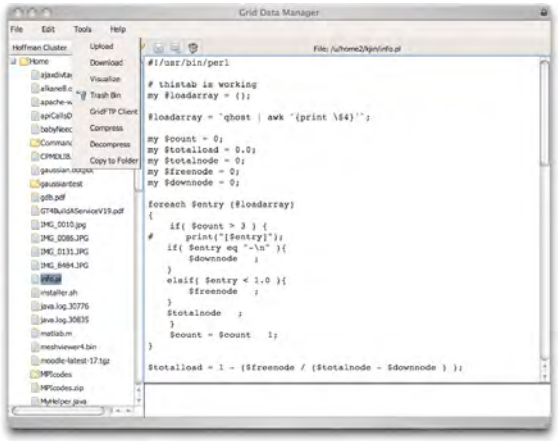


AJAX Data Managers vs. HTML Data Manager

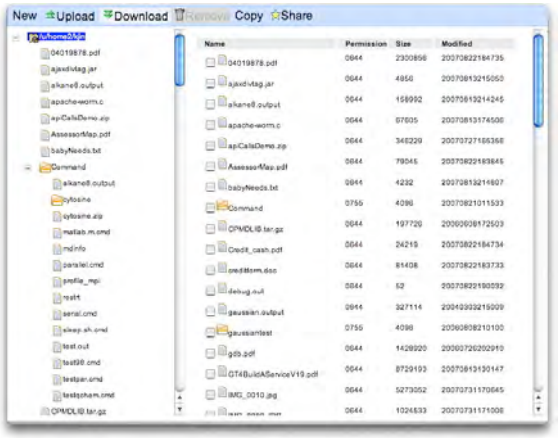
- AJAX Data Managers looks and work like a desktop data manager.



Conventional
Portlet
Cerca 2004



AJAX
Zimbra
Cerca 2005



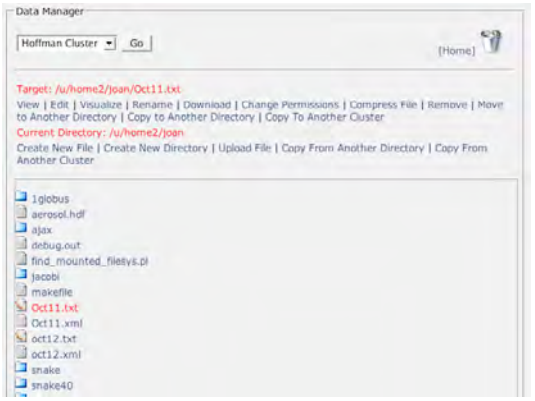
AJAX
GWT
Cerca 2007

Conven-
tional

AJAX

- The user does not have to wait for the entire page to refresh with each click.

1



2

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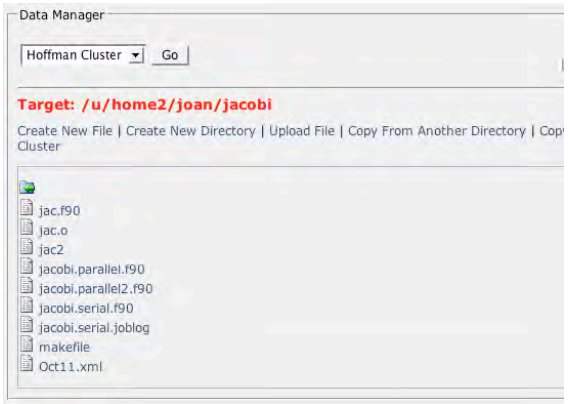

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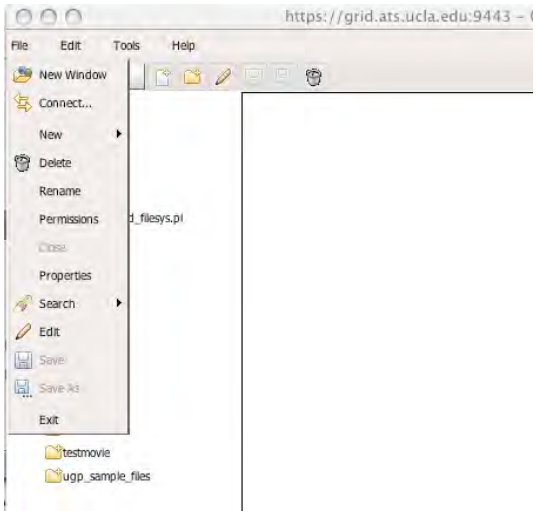

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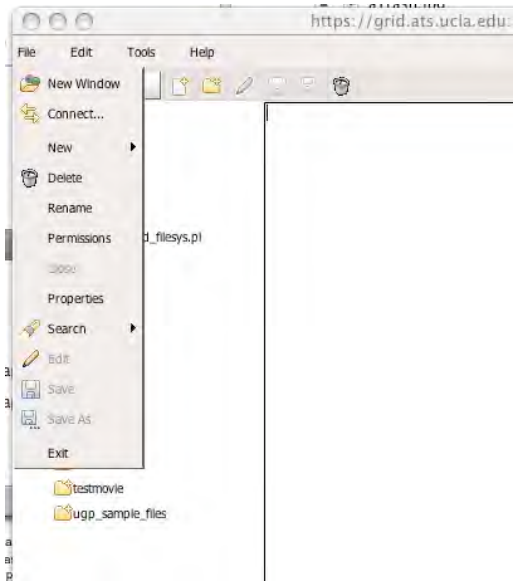

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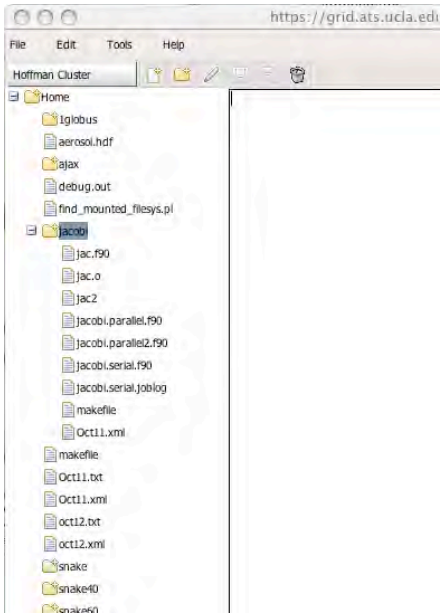
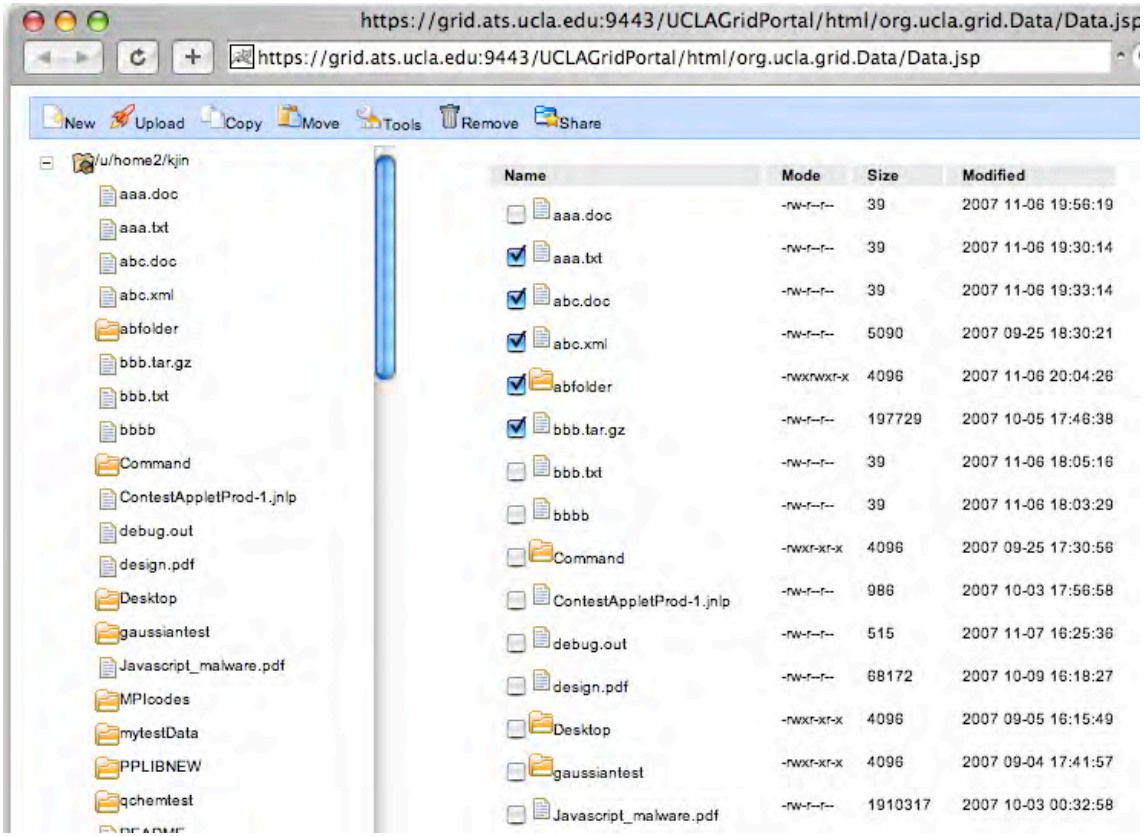


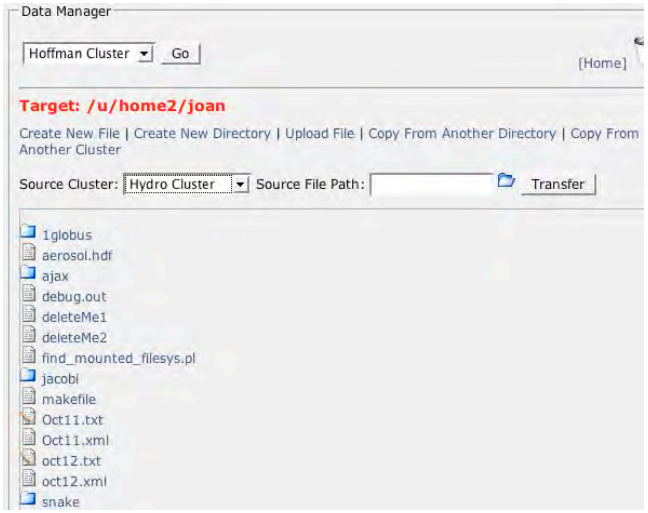
- With AJAX we can do perform the same action on multiple files at once



- In order to attract users to Grid Portals we have to make them as easy to use as possible and offer increased functionality.

FTP -- Conventional

1



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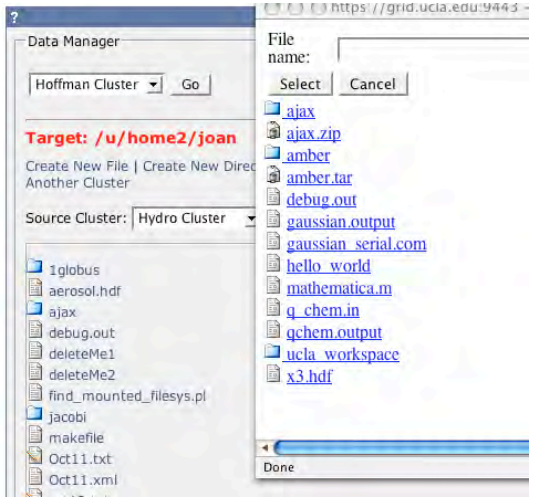

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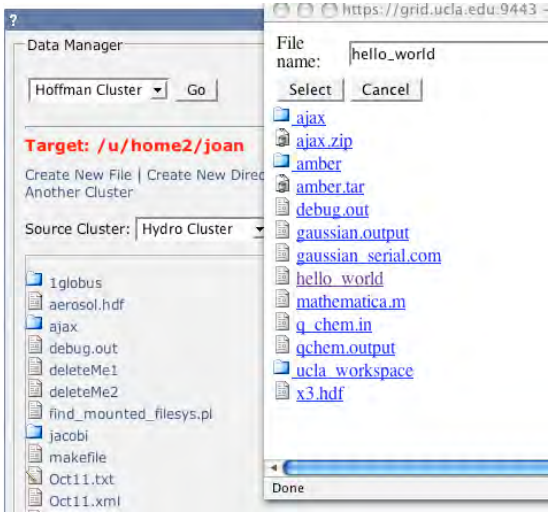

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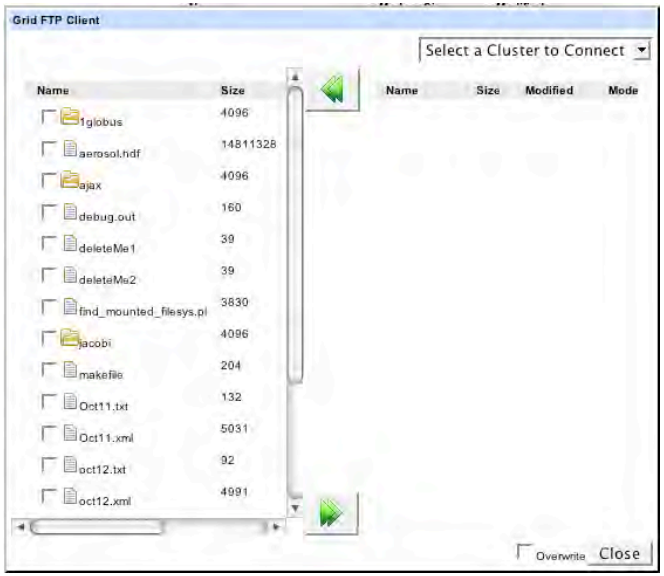
AJAX FTP Client

1



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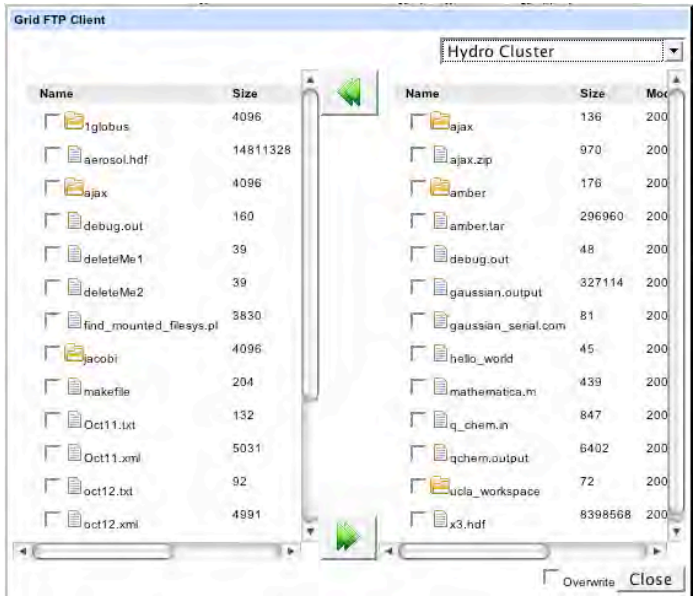

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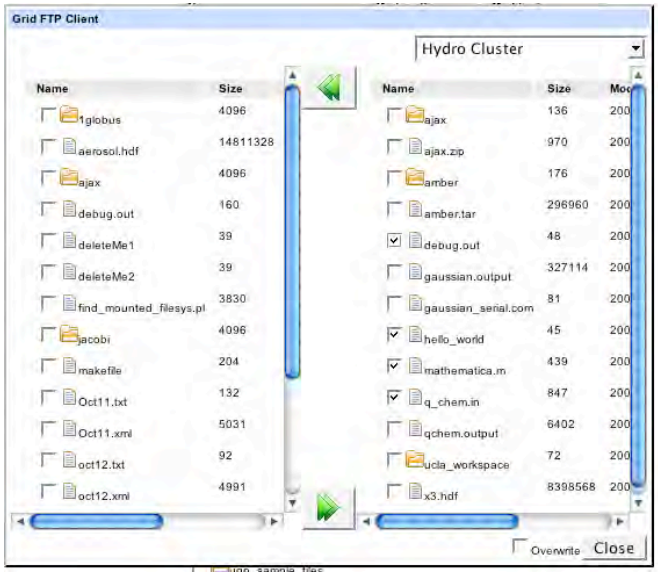
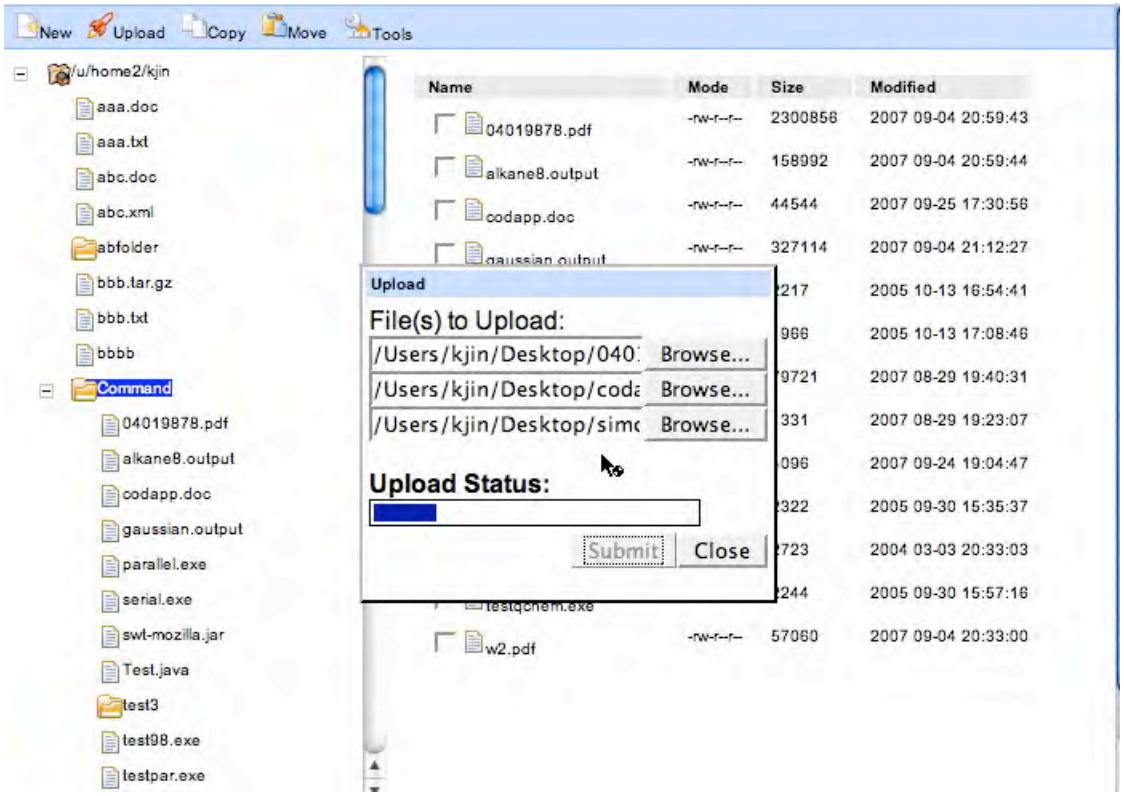
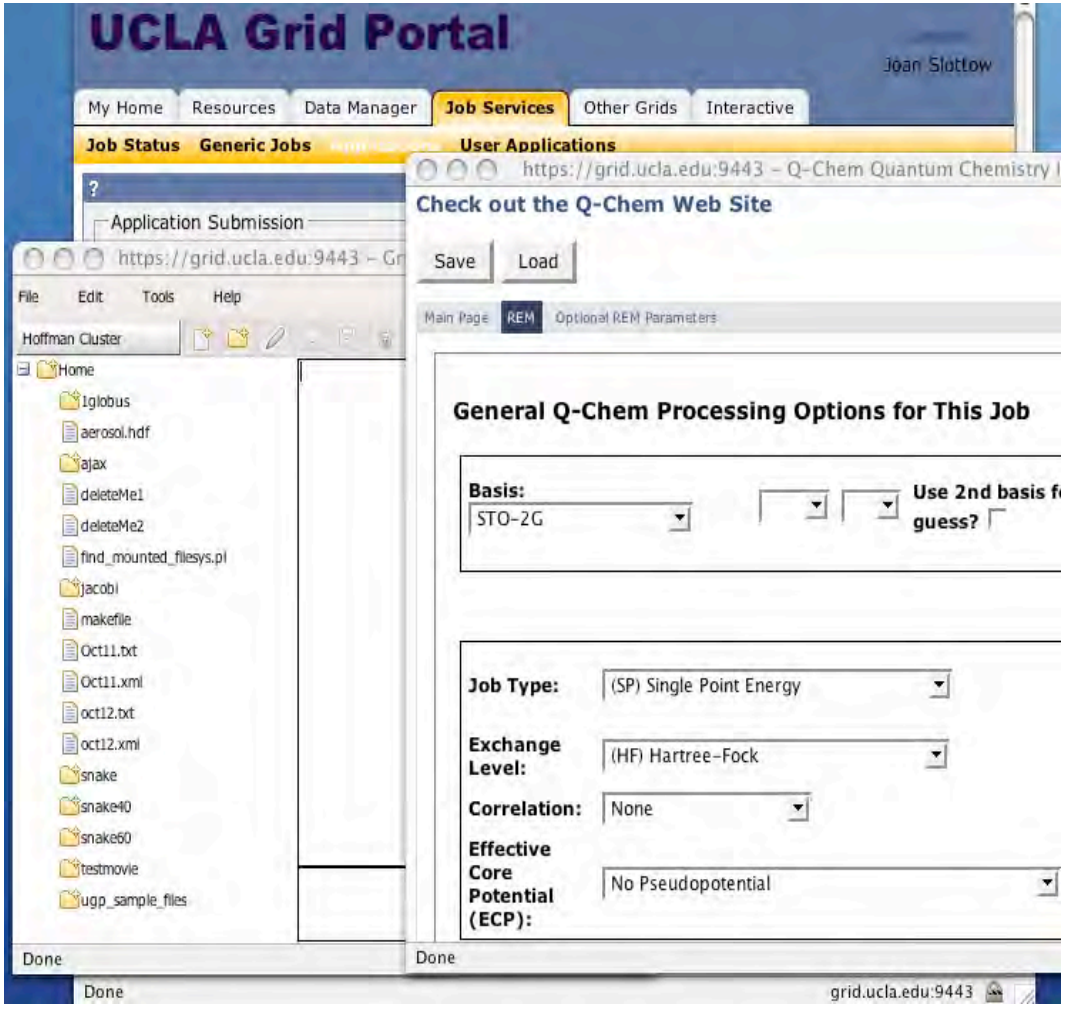


Progress bar

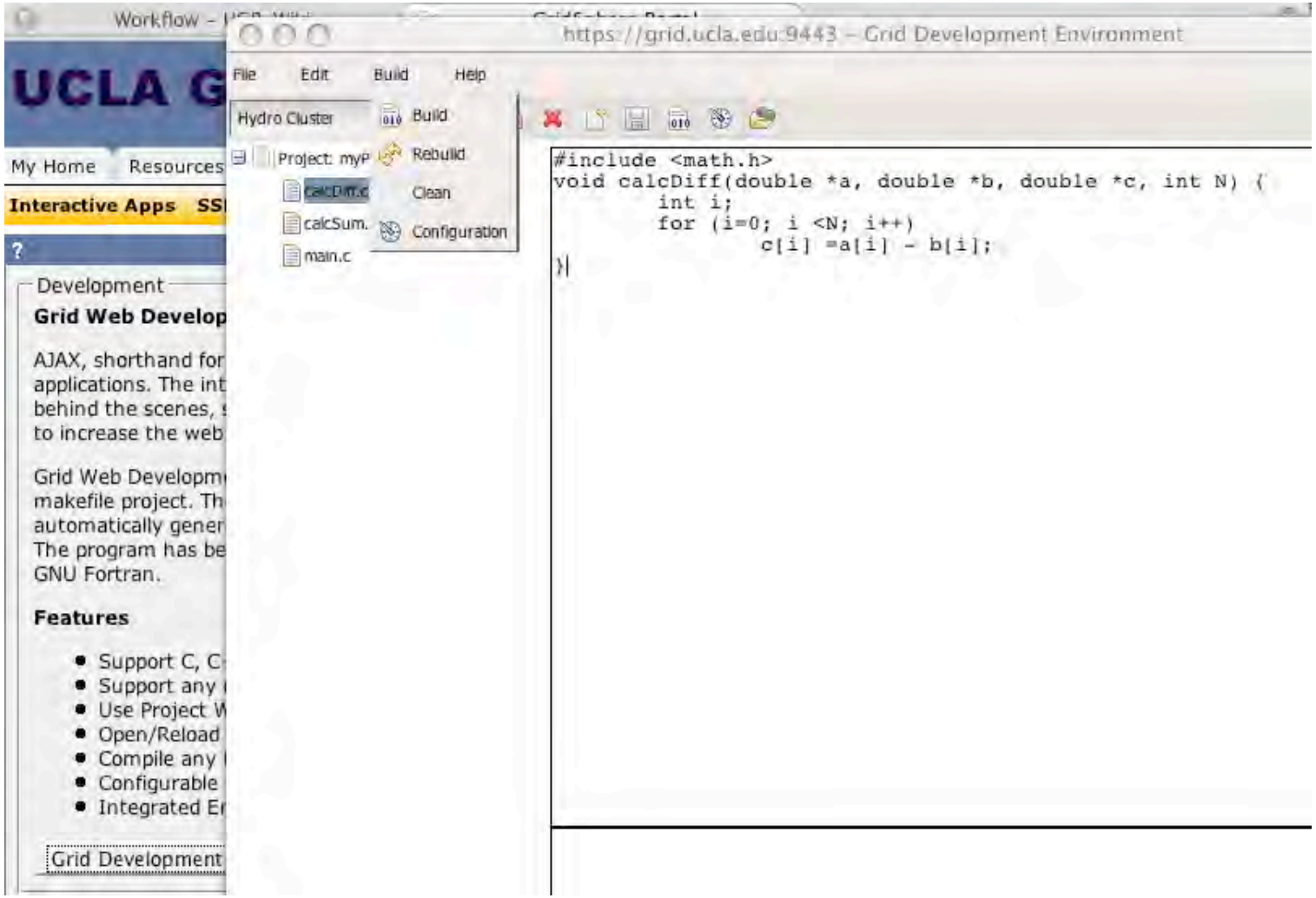
- See the upload progress at real time
- Could not do it without AJAX



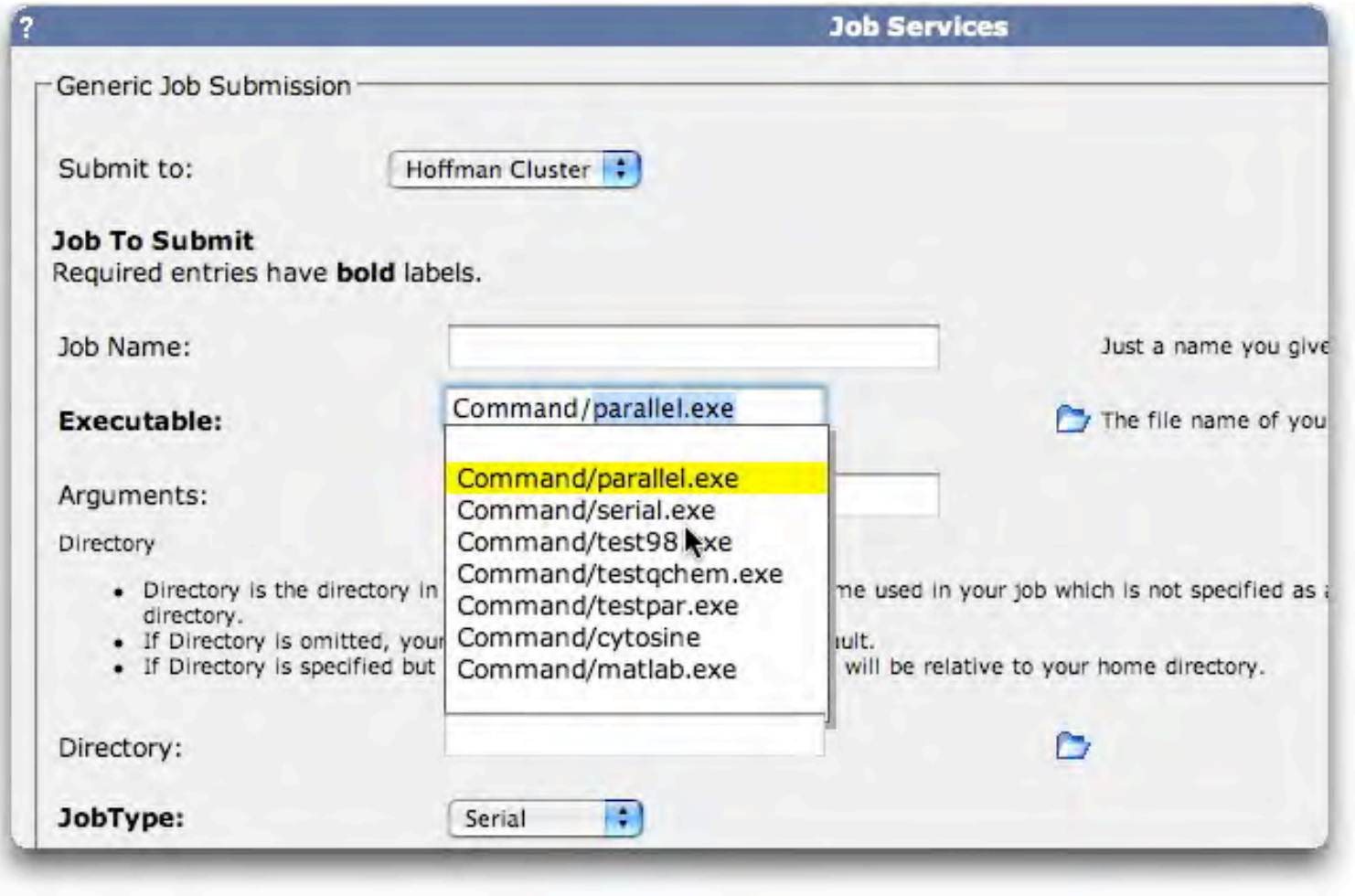
Work with overlapping windows



Grid Development Environment (GDE)



Auto Completion



- Cannot do it without AJAX

Interactive GUI Applications

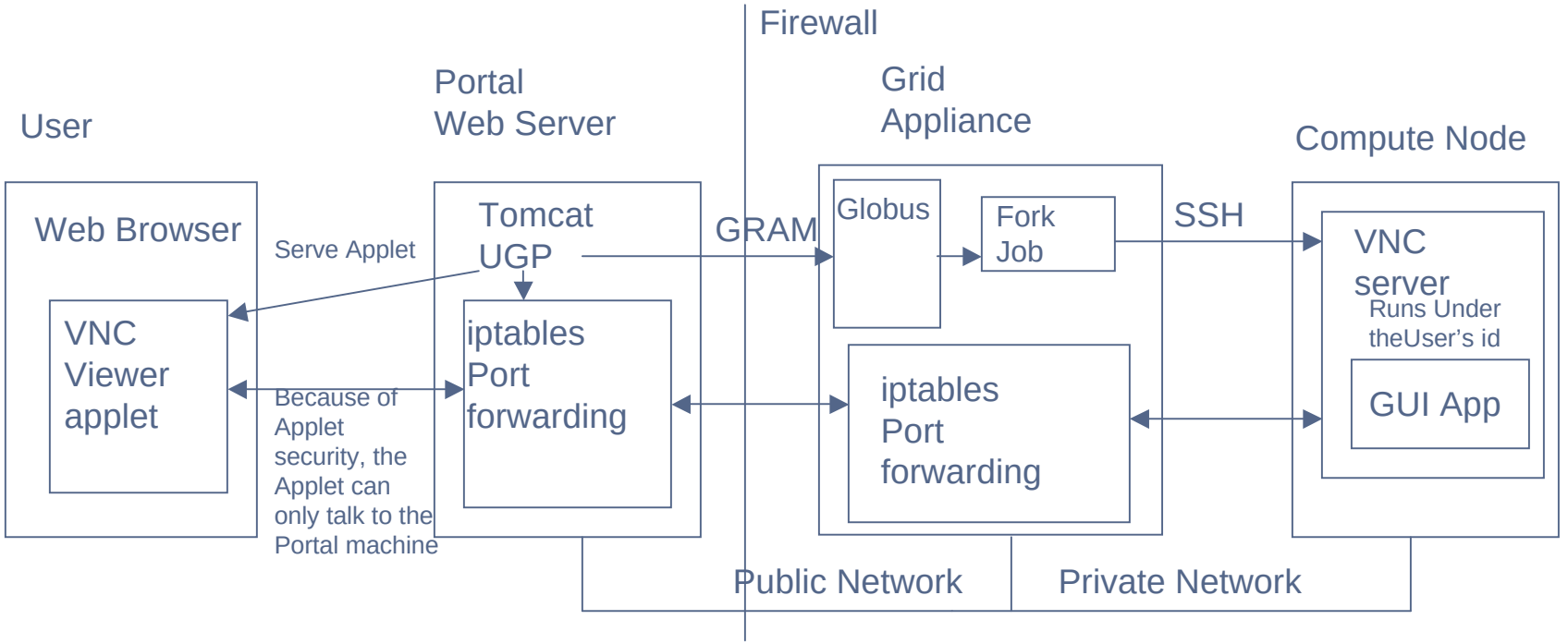
Run on the cluster compute nodes

Interactive Applications via VNC

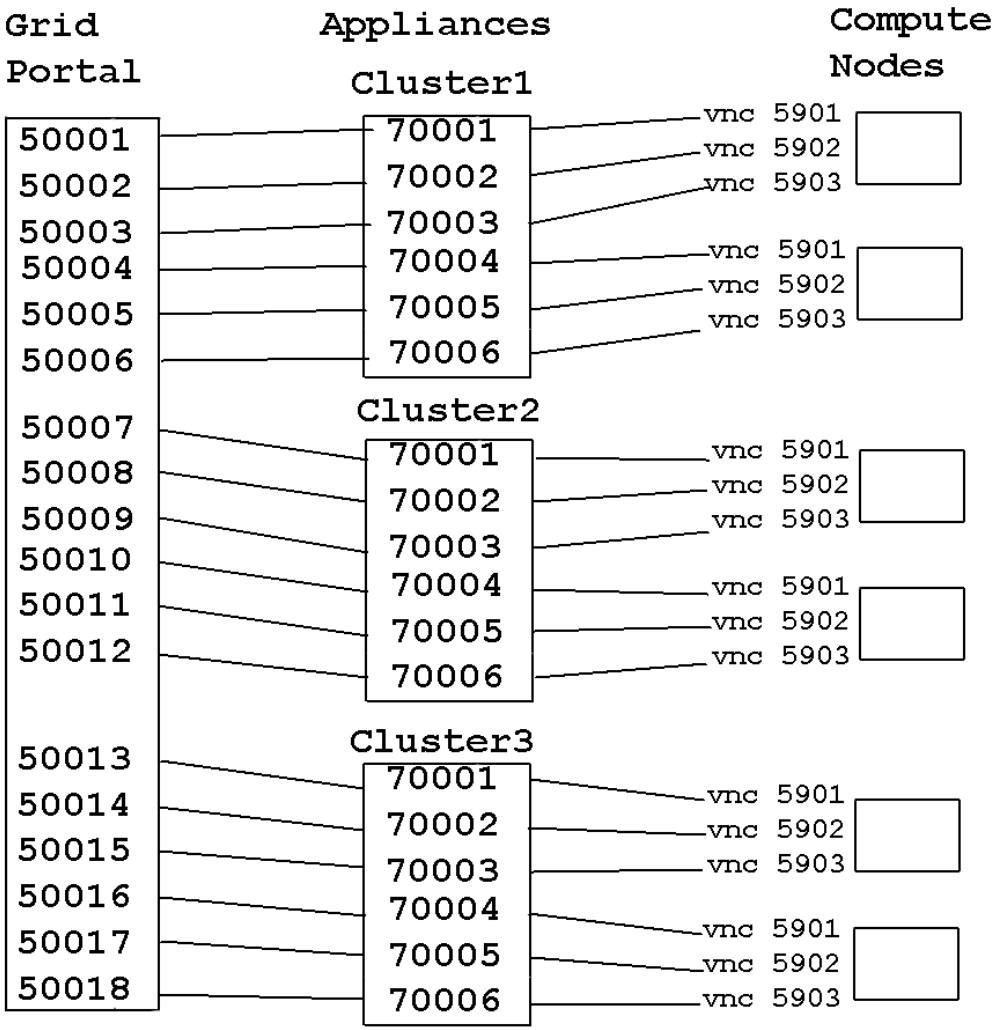
- Previous work in this area:
  - Purdue University's nanoHUB
  - University of Florida's In-VIGO
  - University of Texas Advanced Computer Center (TACC)

Interactive applications via VNC Design Diagram

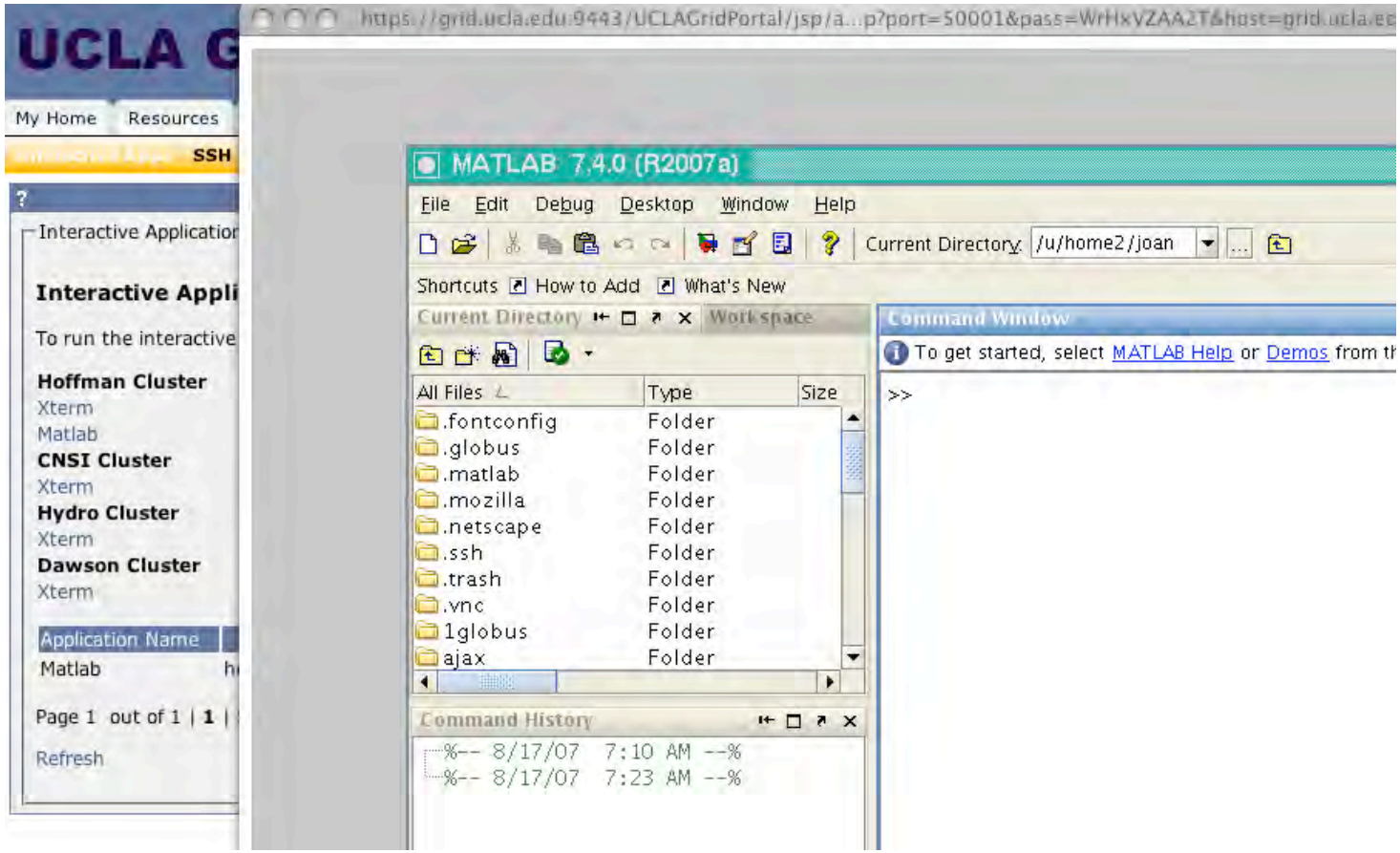
There is 1 Grid Portal
One Grid Appliance per cluster
Multiple VNC servers can be
Running on an Appliance simultaneously



iptables set up for VNC

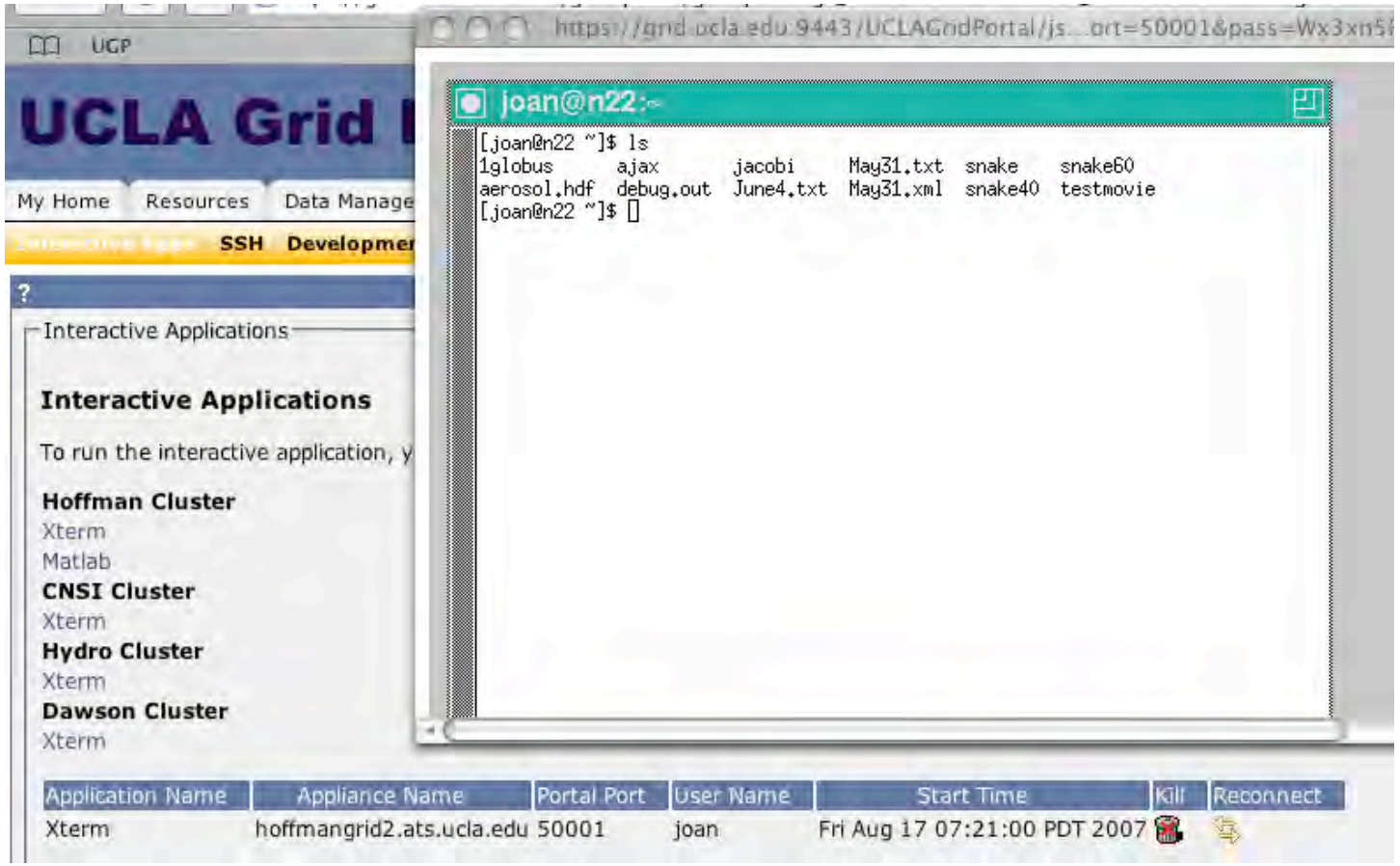


Interactive Matlab



A user can have up to n simultaneous interactive sessions.

Reconnect, kill, timeout



appForm
Application Form for batch jobs

Purpose of appForm

- For batch job submittal.
- User --> form --> input file for the application.
- Designed for the novice/occasional user of the application.

Goals

- Must Work through the Grid Portal
- Easy to add additional applications

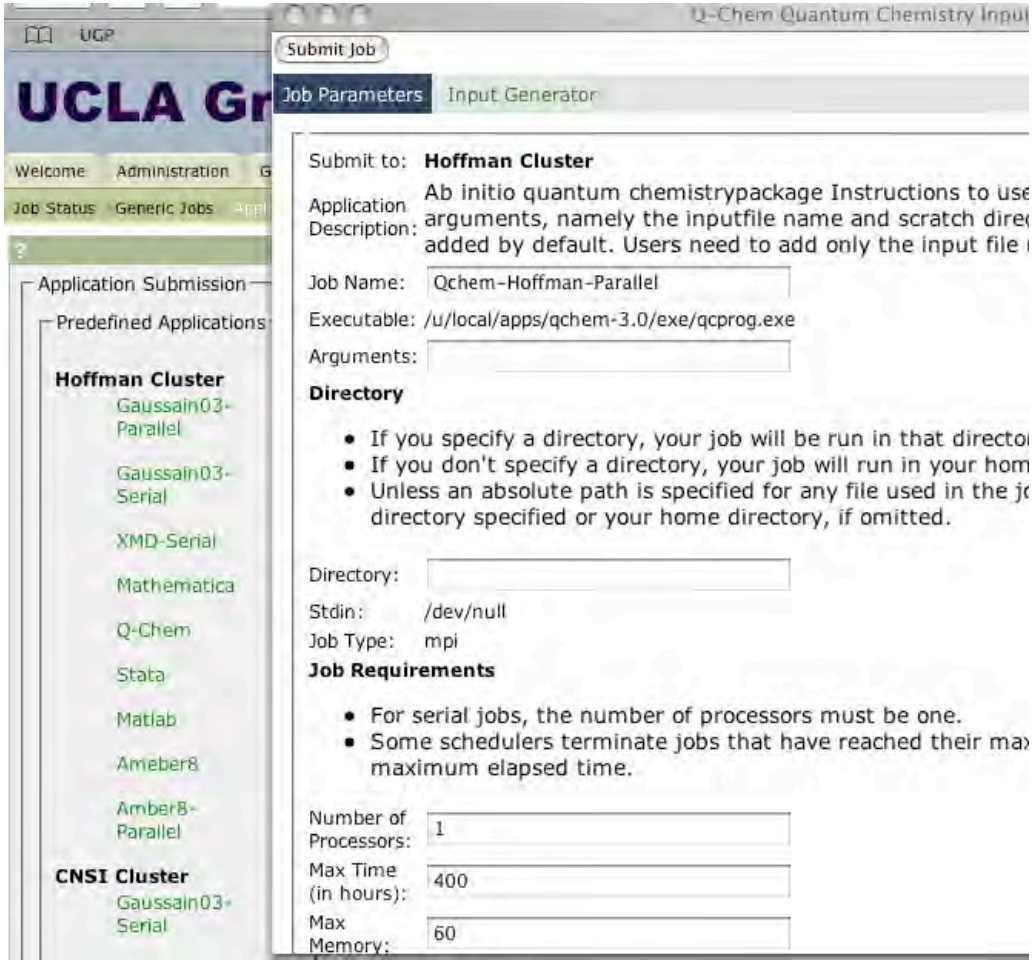
Technologies Used

- XSLT, XML, YUI

Previous Work

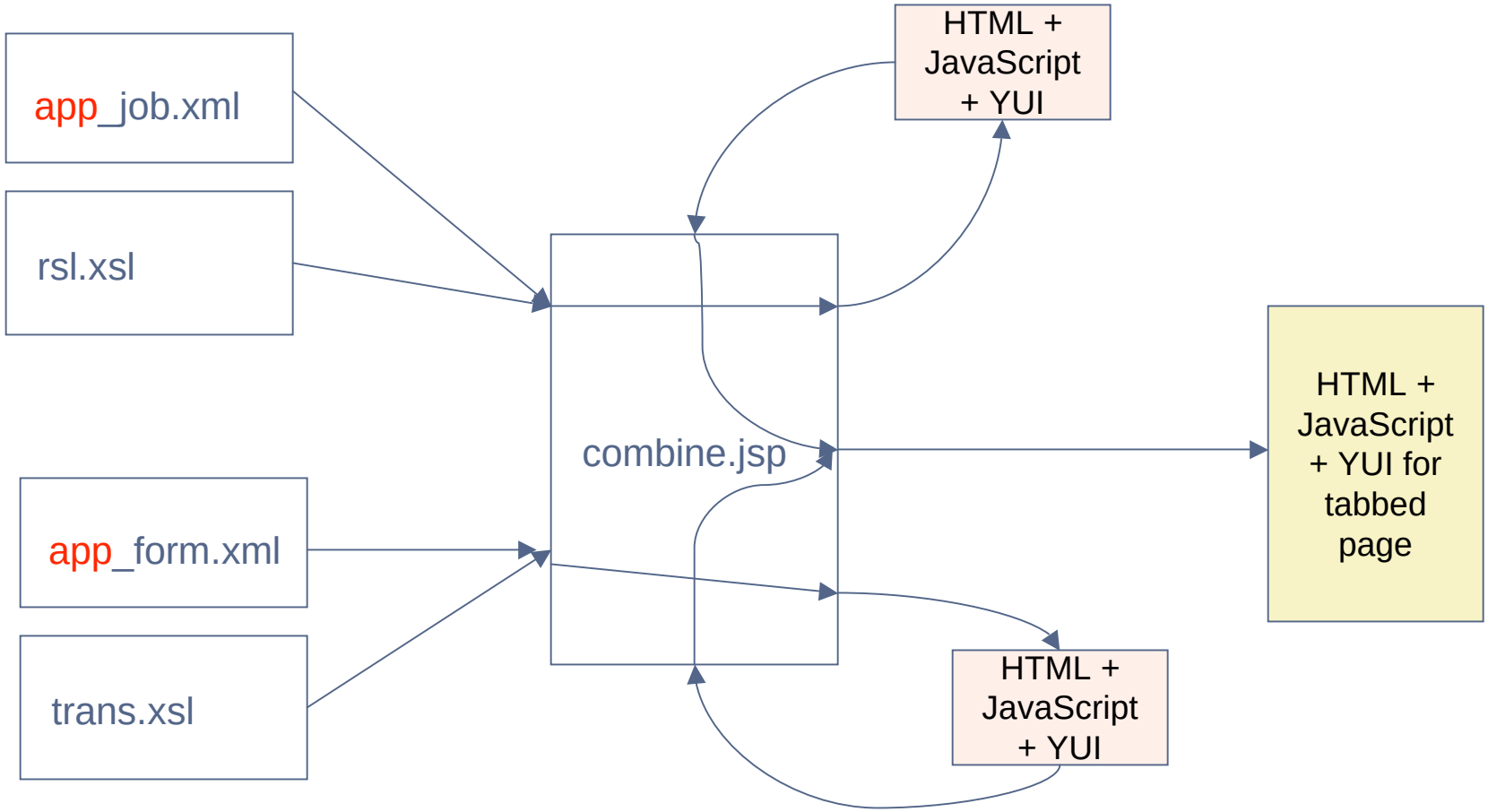
- Purdue/nanoHub Rappture
- San Diego Supercomputer Center (SDSC) and National Biomedical Computation Resource (NBCR) Project Gemstone

appForm uses YUI tabview



Two tabs, one for GRAM rsl (resource specification language) one for appForm

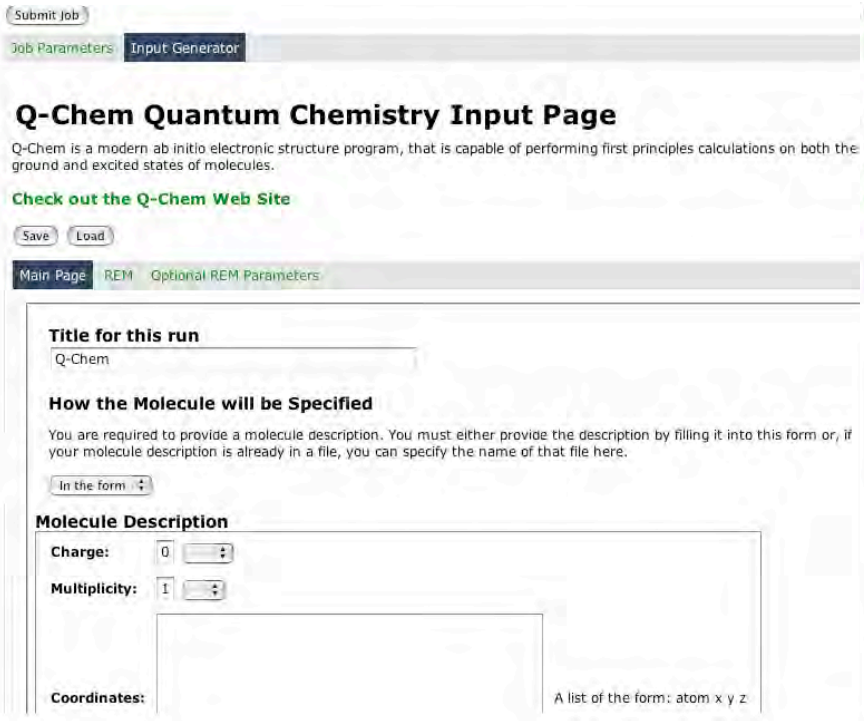
How appForm Works



app_job.xml, app_form.xml and app_forrm_input.xsl must be written for each app.

Dynamic HTML used to change the form

1



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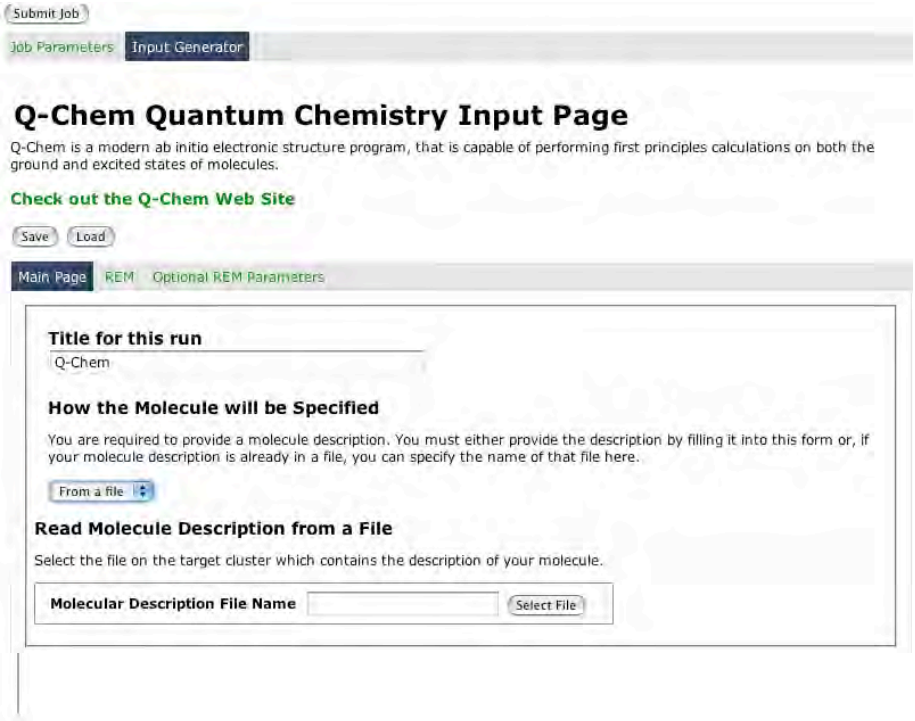
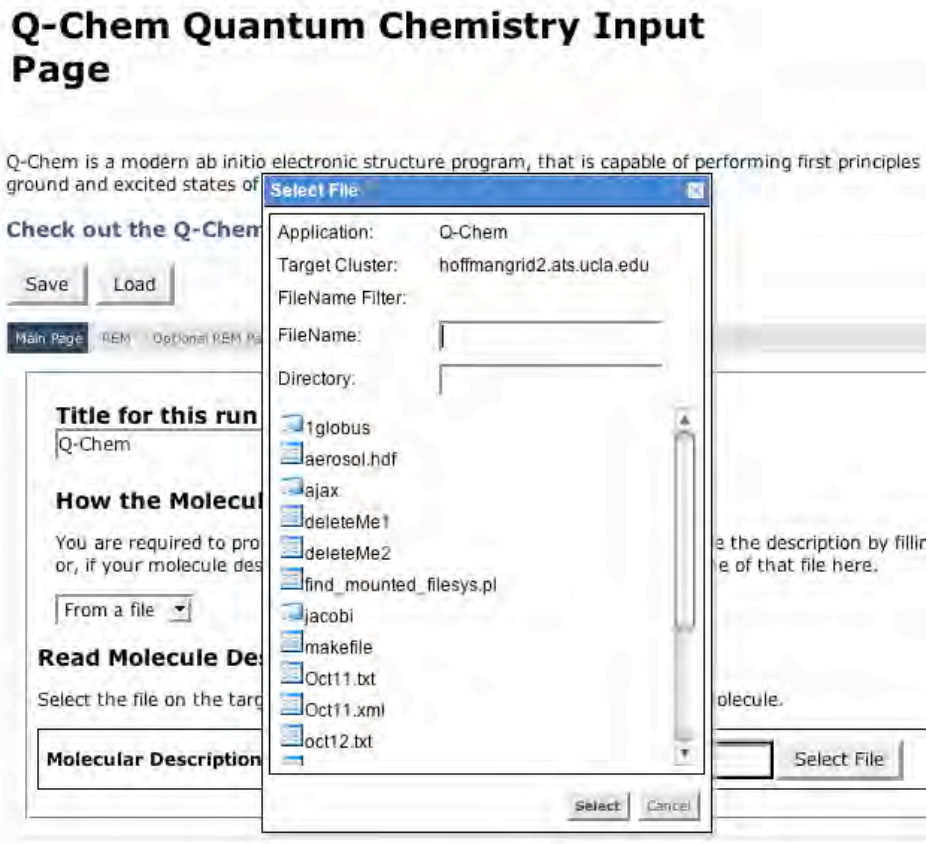


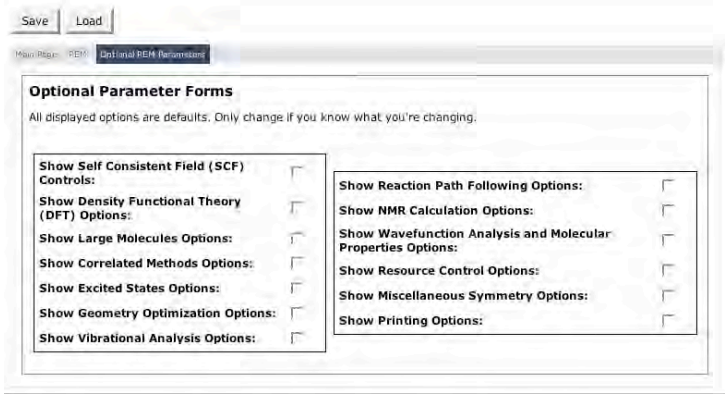
Input Generator tab can itself be divided into multiple tabbed pages
Tabs superior to pages, the user can go back and fourth between the tabs without loss of input values

YUI Dialogs used for file selection



This layout was accomplished simply by specifying the xml for the form

1



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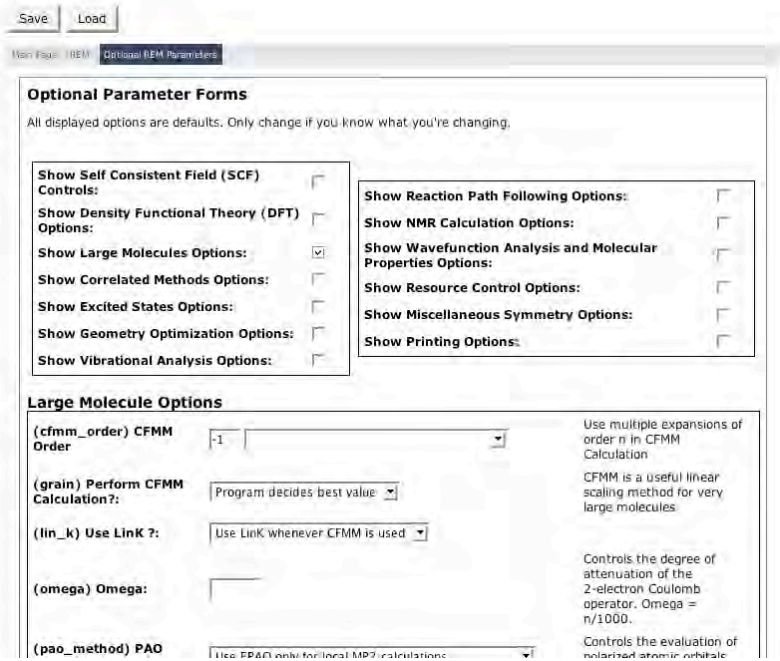
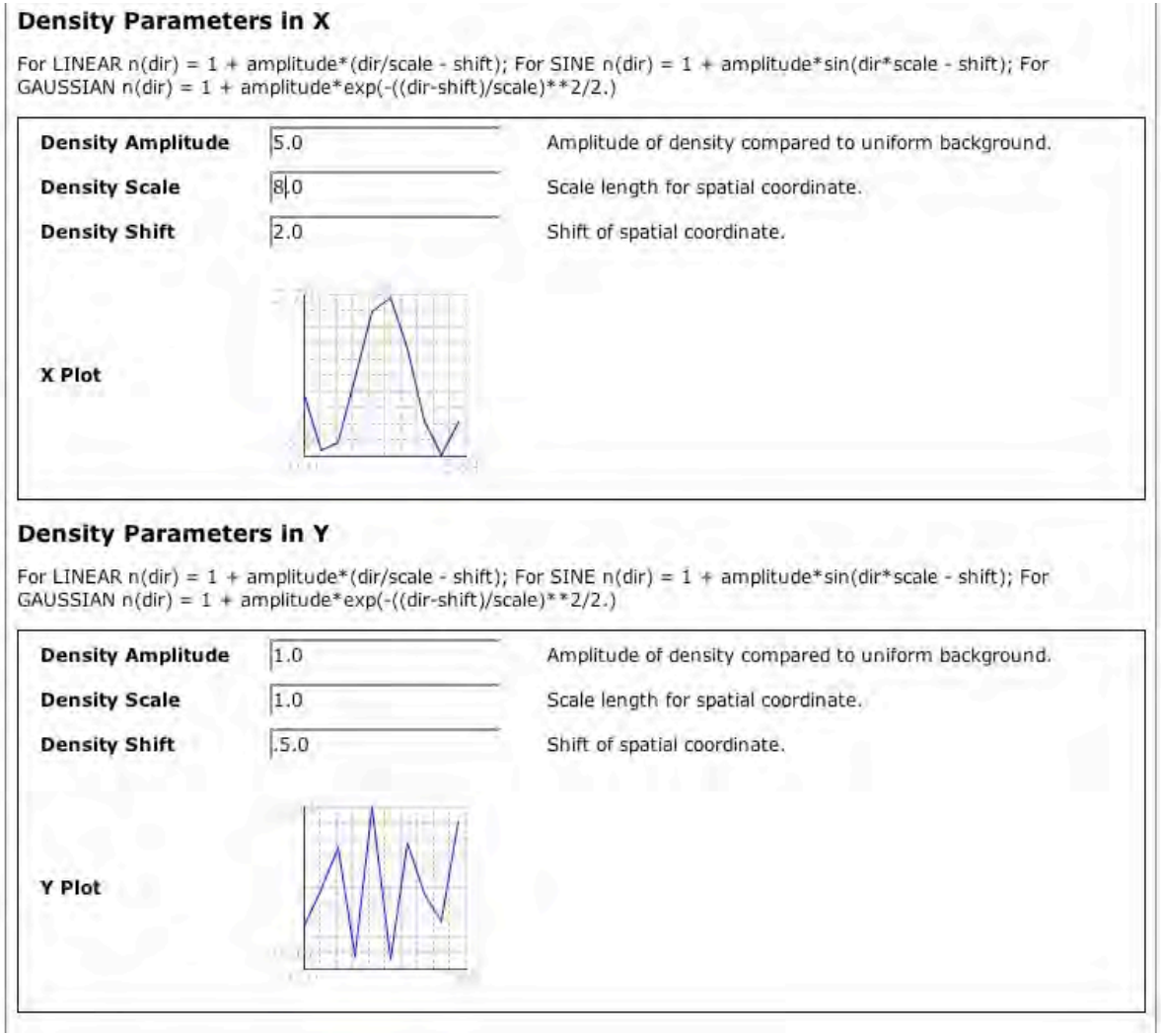


Dynamic Visual Feedback

JMathPlot used via AJAX to generate the graphs from the numbers in the form



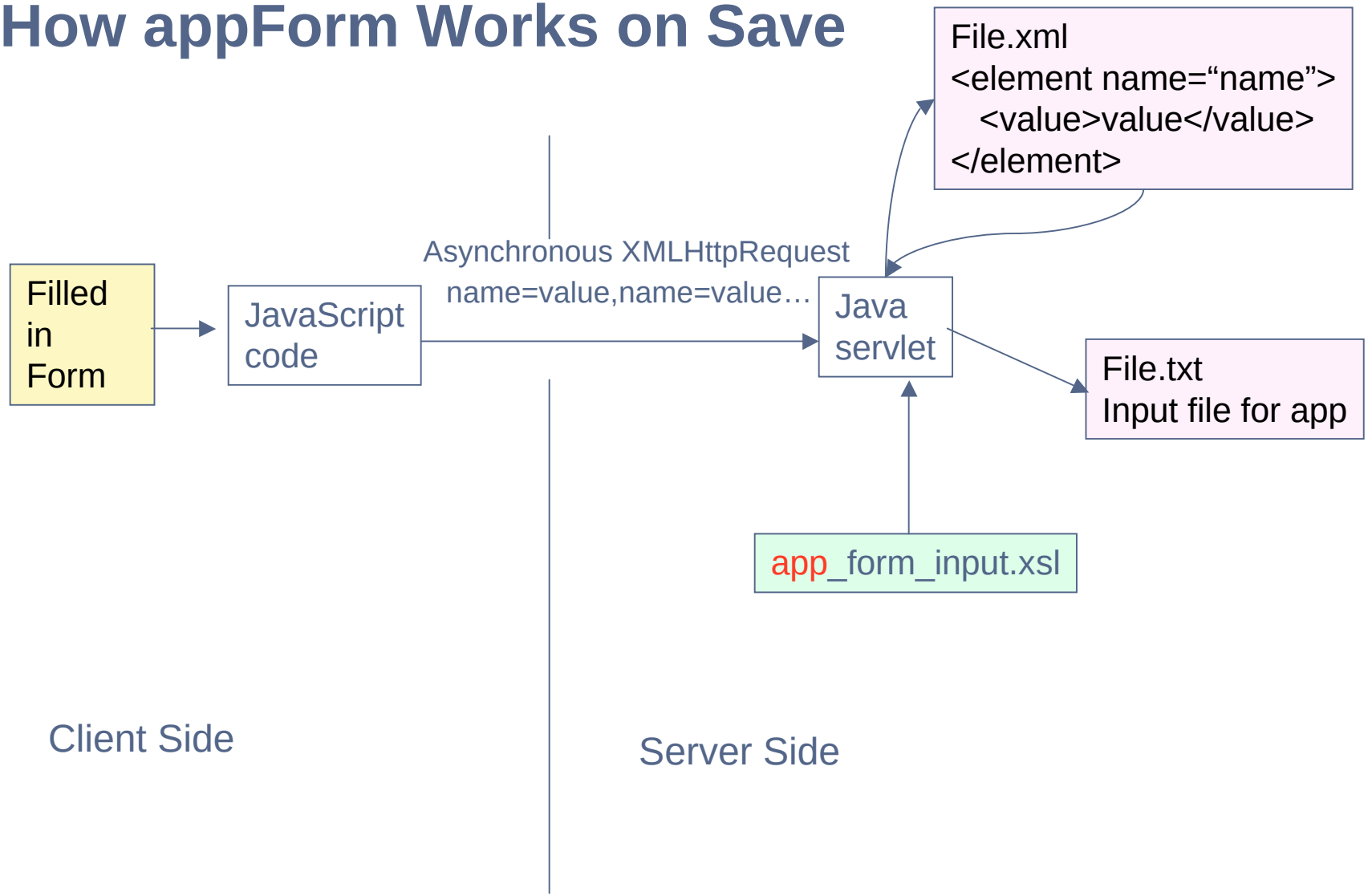
Save Button

saves the input in both .xml application input format.

Load Button

loads the .xml and populates the form.

How appForm Works on Save



To add an application:

1. **Define your job submission Interface via XML** (simple)
2. **Define your input generation interface via XML** (simple but takes doing)
3. **Traslate to the application input your input format via XSLT (**More complicated but can copy and modify existing translator)

Interested in UGP?

UGP documentation, download, wiki
http://www.ucgrid.org

Or catch Prakashan, Kejian or myself.