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Commodity Grid (CoG) Kits Abstractions CoG Abs

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www.cogkits.org

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Outline

- What are CoG Kits? (1 minute)
- What are CoG Abstractions?
- What are we doing with CoG Abs? : Gridfaces (visual components)

Observation (cont.)

- Problem
  - Many application developers desire to program the Grid in familiar higher level frameworks that allow rapid prototyping.
- Solution
  - We propose to reuse a variety of commodity tools, protocols, approaches, methodologies, while integrating Grid software based on the Globus Toolkit
    - Easier development of advanced Grid services
    - Easier and more rapid application development
    - Easier deployment of Grid services
    - Code reuse and use of component repositories
    - Use of Web services as part of the Grids
    - Widespread use of the Grid
    - Use of commodity technology is not limited to the client!

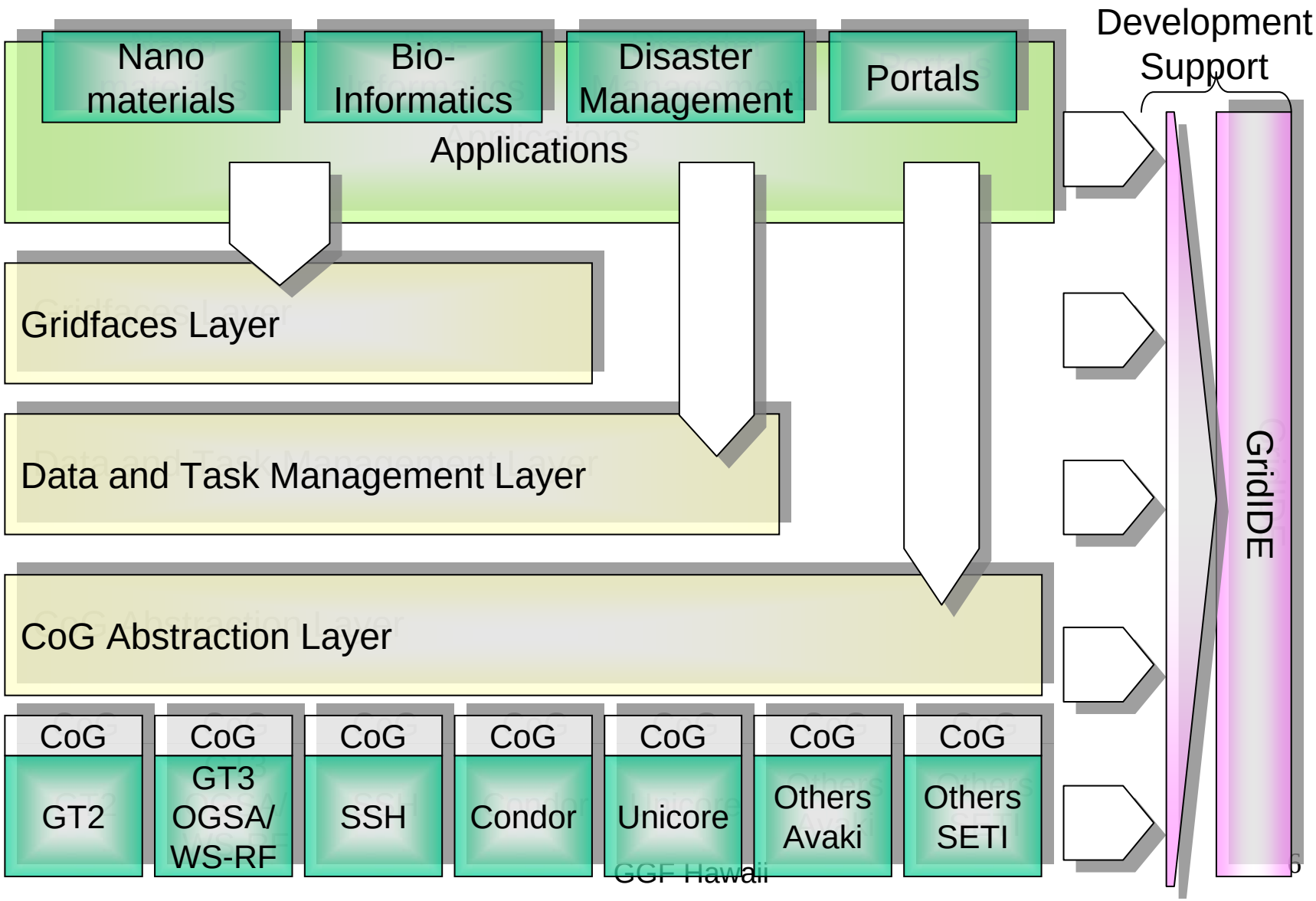
Overview: CoG Kits

- Project Goals: Make Grid programming simple
- Approach: Develop CoG Kits for Java and Python
  - Others are possible, but that's what we focus on
  - Available since 1997
- We have experience in this group dating back to the beginning of Grid and Distributed Computing

Abstractions

- Hypothesis:
  - With rapidly changing technologies it may be beneficial to have an abstraction that can be assisting in this technical challenge
  - Charter of the Research Group
  - CoG Abs shares this vision

CoG Abstraction Layers



Grid Abstractions

- Hides the underlying toolkit
  - GT2, GT3, ssh, Unicore,
  - others such as Condor could be possible
- Has advanced data structures and services
  - Such as graphs, workflows, queues, …
- Provides elementary API's to
- Security management
- Job management
  - Including Workflow management
- File management
  - Including Queues

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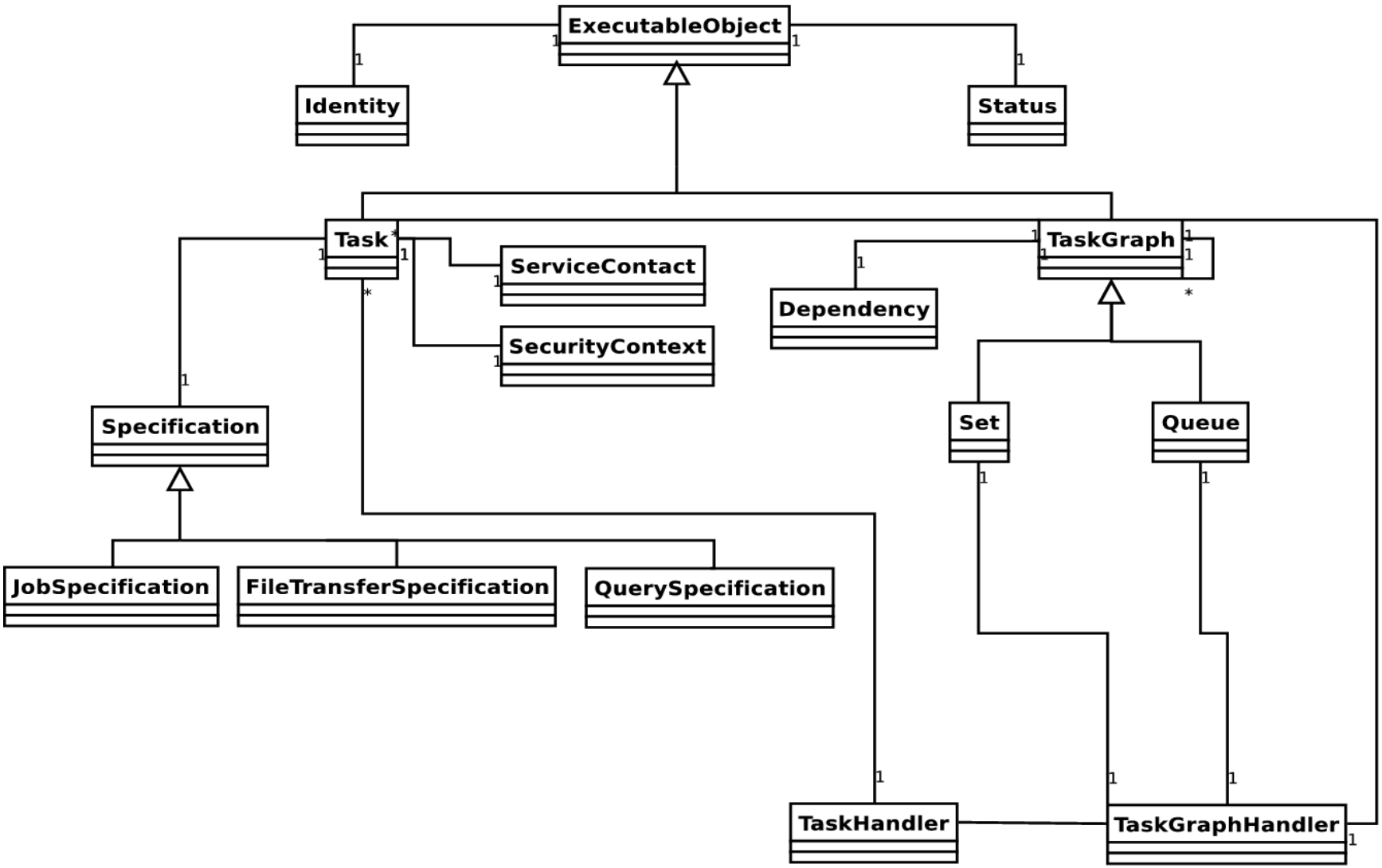
Task Abstractions are part of CoG



Directory Management Abstractions

```
public interface DirectoryManagementResource extends GridResource {
   ...
    // set\/get  Host, port, protocol, URI, SecurityContext
    void setCurrentDirectory(String directory);
    String getCurrentDirectory();
    Enumeration list (String directory)
    void rmdir(String directory, boolean force)
    void getFile (String remoteFilename, String localFileName)
    void putFile(String localFilename, String remoteFileName)
    void getDir( String remoteDirname, String localDirName)
    void putDir(String localDirname, String remoteDirName)
    void chmod(String filename, int mode)
    boolean isReadable(String filename)
    void makeWritable(String filename, boolean writable)
    boolean isWritable(String filenam
    long size(String filename)
    boolean exists(String filename)

    boolean isDirectory(String dirName)
...
}
```

Using CoG Abstractions

Build Higher Level Abstractions: Grid Resource With a Queue

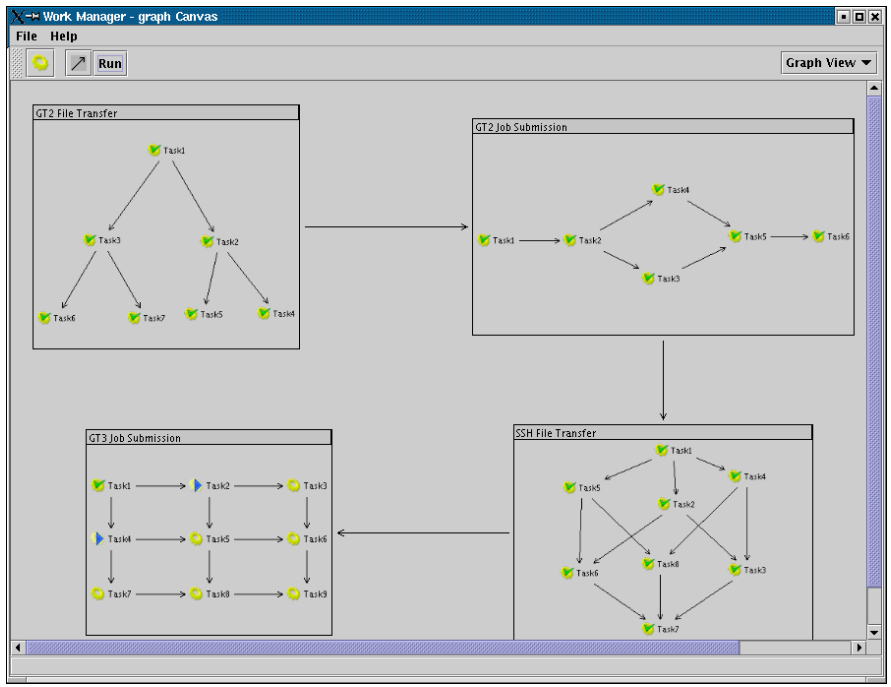
```
// pseudocode

interface QueueEnabledExecutionResource extends GridResource {

    void setQueue (Queue queue);
    Queue getQueue ();

    void submit (String provider, ExecutableObject executableObject);
    void remove (Identity identity);


    void setServiceContact (ServiceContact serviceContact);
    ServiceContact getServiceContact (String provider, int serviceType);

    void setSecurityContext (String provider, SecurityContext securityContext);
    SecurityContext getSecurityContext (String provider);

    Enumeration getAllSubmittedTasks ();

    void setAttribute (String name, Object value);
    Object getAttribute (String name);

}
```

Build Higher Level Abstractions: Grid Resource With QoS

```
// pseudocode

interface QoSEnabledExecutionResource extends GridResource {

    void setQueue (Queue queue);
    Queue getQueue ();

    void submit (Date startTime, Date EndTime, String provider, ExecutableObject executableObject,);
    void remove (Identity identity);


    void setServiceContact (ServiceContact serviceContact);
    ServiceContact getServiceContact (String provider, int serviceType);

    void setSecurityContext (String provider, SecurityContext securityContext);
    SecurityContext getSecurityContext (String provider);

    Enumeration getAllSubmittedTasks ();

    void setAttribute (String name, Object value);
    Object getAttribute (String name);

}
```

GridAnt and Karajan

- Workflow visualization
- We can submit to
  - GT2
  - GT3.02
  - SSH
  - (Unicore)



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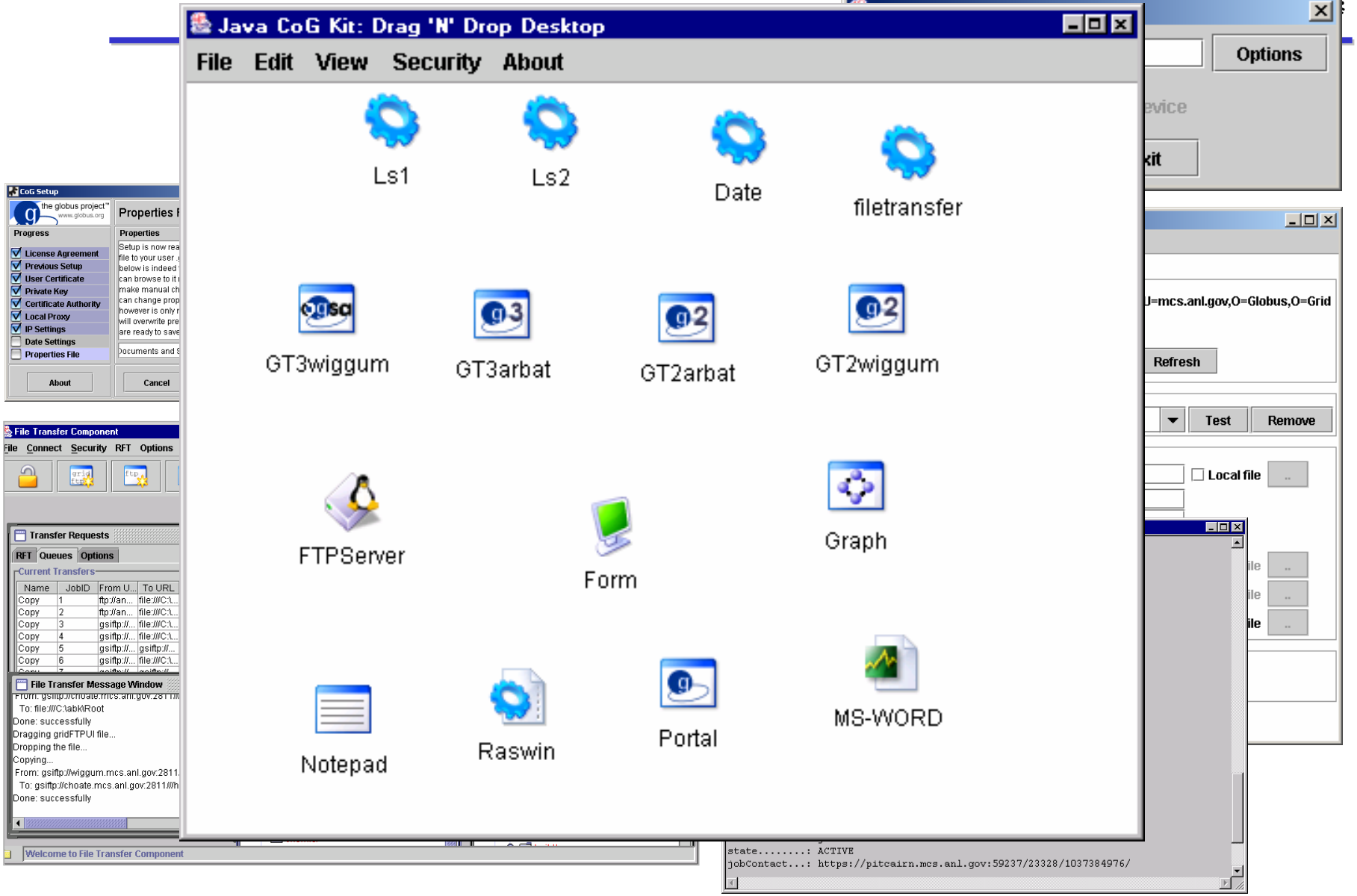
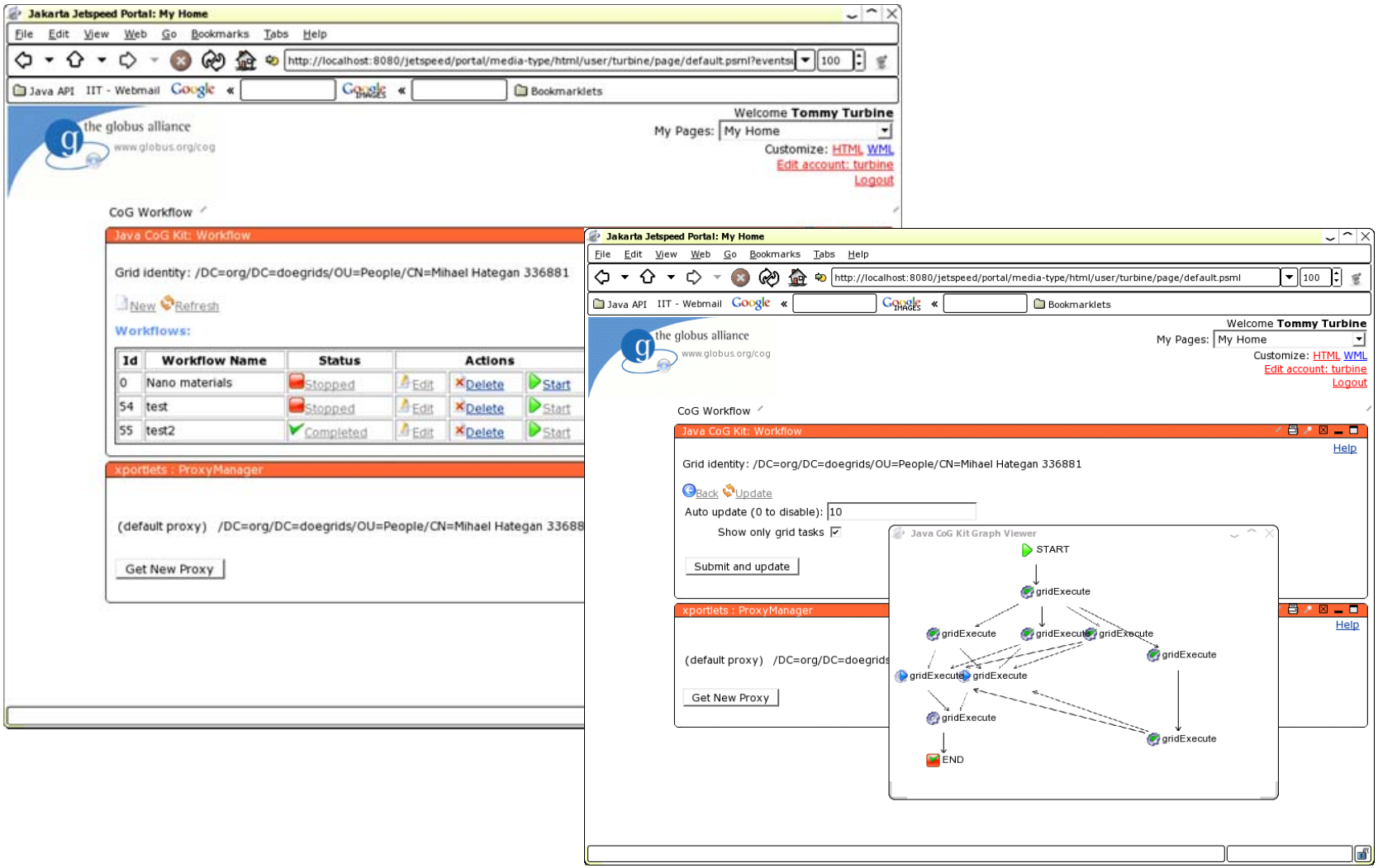
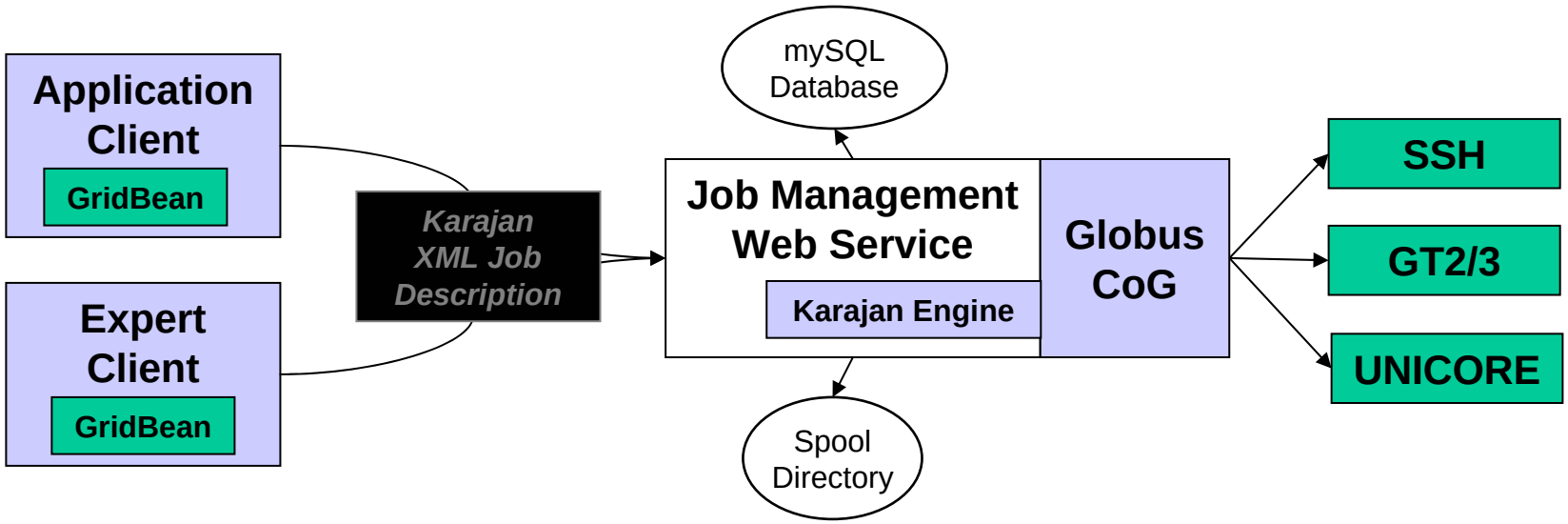
Java CoG Kit User Interface Components



OGCE Use Case



Intel Grid Programming Environment: Proof of Concept Implementation



- Database keeps track of jobs and files
- Files are spooled at web service
- Service and two Clients implemented

Further Information

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  - **http://www.cogkits.org/**
- **Contacts**
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- **Accknowledgement**
  - DOE, NSF
  - Mary Anne Scott, Ian Foster, Dennis Gannon