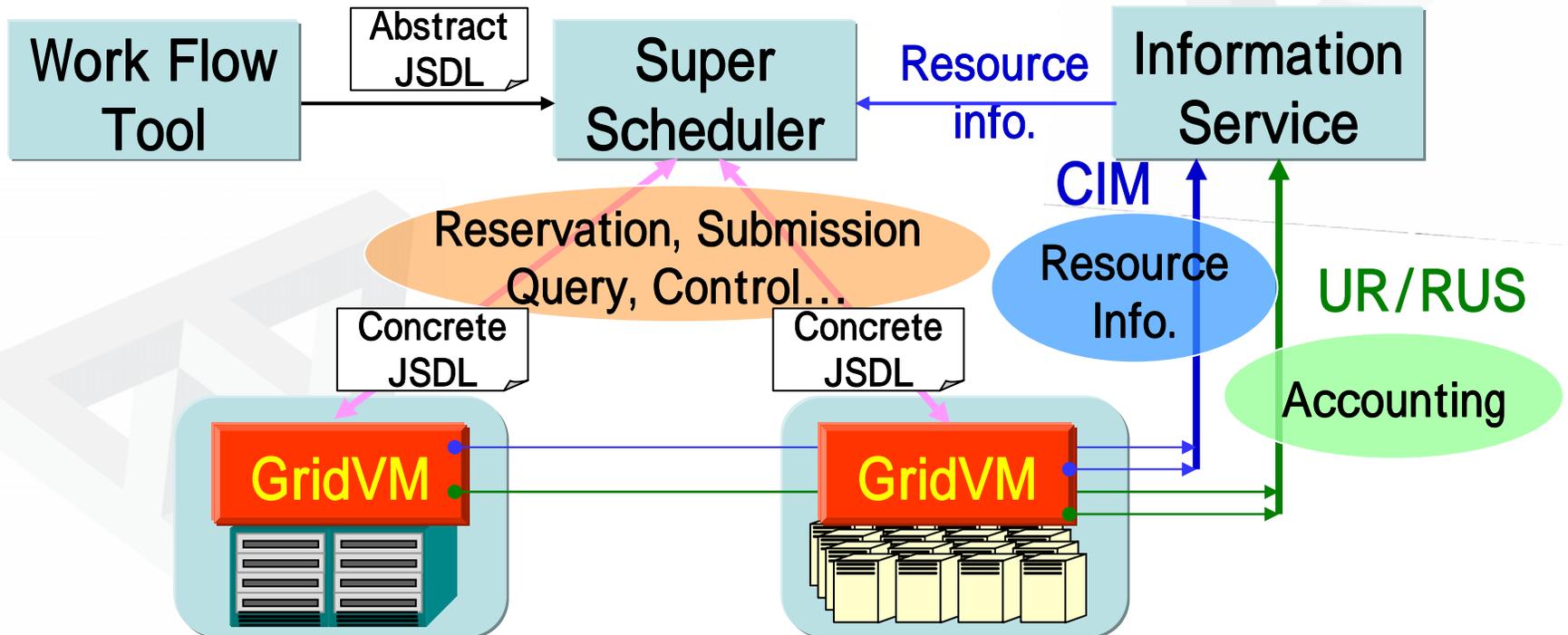

NAREGI GridVM Execution Service API

GGF13 BES BOF
NAREGI WP1

What is GridVM?

- ✓ Virtual execution environment on each site
 - Job execution services
 - Resource provider services
 - Secure and isolated environment



Requirements for Execution Service

- ✓ **Provide platform independence**
 - Unified interface for heterogeneous platforms and local schedulers
 - Java → WSRF
- ✓ **Use standards for interoperability**
 - JSDL as job submission description language
- ✓ **Support agreement based execution**
 - Provide resource and service based on local site's policy
- ✓ **Realize the execution of meta-computing job**
 - Essential for large scale multi-physics jobs that run across heterogeneous platforms

API Overview

- ✓ The following services are provided through methods of GridVMJobService.
- Resource reservation/ cancellation
 - Job submission/ control/ status query
 - Event notification

```
GridVMJobServiceFactory
```

```
+ createJobService()
```

```
<<interface>>  
GridVMJobService
```

```
+ makeReservation()  
+ cancelReservation()  
+ submitJob()  
+ controlJob()  
+ queryJob()  
+ addGridVMJobEventListener()
```

GridVMJobService

```
public interface GridVMJobService{

    // Control Action
    public static final int ACTION_SUSPEND;
    public static final int ACTION_RESUME;
    public static final int ACTION_HOLD;
    public static final int ACTION_RELEASE;
    public static final int ACTION_DELETE;

    // Job Status
    public static final int JOBQUERY_RESERVED;
    public static final int JOBQUERY_QUEUED;
    public static final int JOBQUERY_RUNNING;
    public static final int JOBQUERY_SUSPENDED;
    public static final int JOBQUERY_HELD;

    // Reservation
    public org.w3c.dom.Document makeReservation(org.w3c.dom.Document jsdl)
        throws GridVMException;
    public void cancelReservation(String subJobID)throws GridVMException;

    // Job control
    public void submitJob(org.w3c.dom.Document jsdl) throws GridVMException;
    public void controlJob(String subJobID, int action,
        org.w3c.dom.Document information) throws GridVMException;
    public int queryJob(String subJobID) throws GridVMException;

    // Event Listener
    public void addGridVMJobEventListener(GridVMJodEventListener listener);
}
```

Reservation

✓ "makeReservation" method

- Makes a reservation with "JSDL" as job requirement
 - This method is called during a agreement process with resource consumer (Super-Scheduler)
 - Use JSDL with some extension for parallel job execution and co-allocation
- Assigns "SubjobID" used for subsequent operations
- Properties that are reserved are:
 - Start time, Wall time, resources such as nodes of cluster ...

✓ "cancelReservation" method

- Cancels a reservation specified by "SubjobID"

Job Submit/ Control/ Query

✓ "submitJob" method

- Submits a job with "JSDL"

✓ "controlJob" method

- Controls a job according to specified "Action"
- Action is one of:
 - Suspend , Resume , Hold , Release , Delete

✓ "queryJob" method

- Queries status of a job
- Returned status is one of:
 - Reserved , Queued , Running , Suspended , Held

Event Notification

✓ “addGridVMEventListener” method

- Registers a event listener for event notification
- Notified event is one of:
 - Reserved, Reservation canceled, Queued, Started, Terminated , Suspended , Resumed , Held , Released

```
//The interface that event listener should implement  
public interface GridVMJobEventListener{  
    public void actionPerformed(GridVMJobEvent e);  
}
```

✓ GridVMJobEvent object

- Is passed to registered event listeners as an event occurs
- Contains information on occurred event

Current Status and Next Plan

✓ Current Status

- Implemented on PBSPro and SCore.
- Realized meta-computing by using the API with JSDL extension between NAREGI Super-scheduler and GridVM.

✓ Next Step

- Verify effectiveness of the API for several execution patterns such as complicated workflow, multi-physics jobs and high-throughput executions.
- Implement the API on other platforms.
- Evolve into WSRF/OGSA framework and implement GridVM as a OGSA Service Container.