Latest improvements in the GridWay metascheduler

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Initiative for Globus in Europe

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Introduction

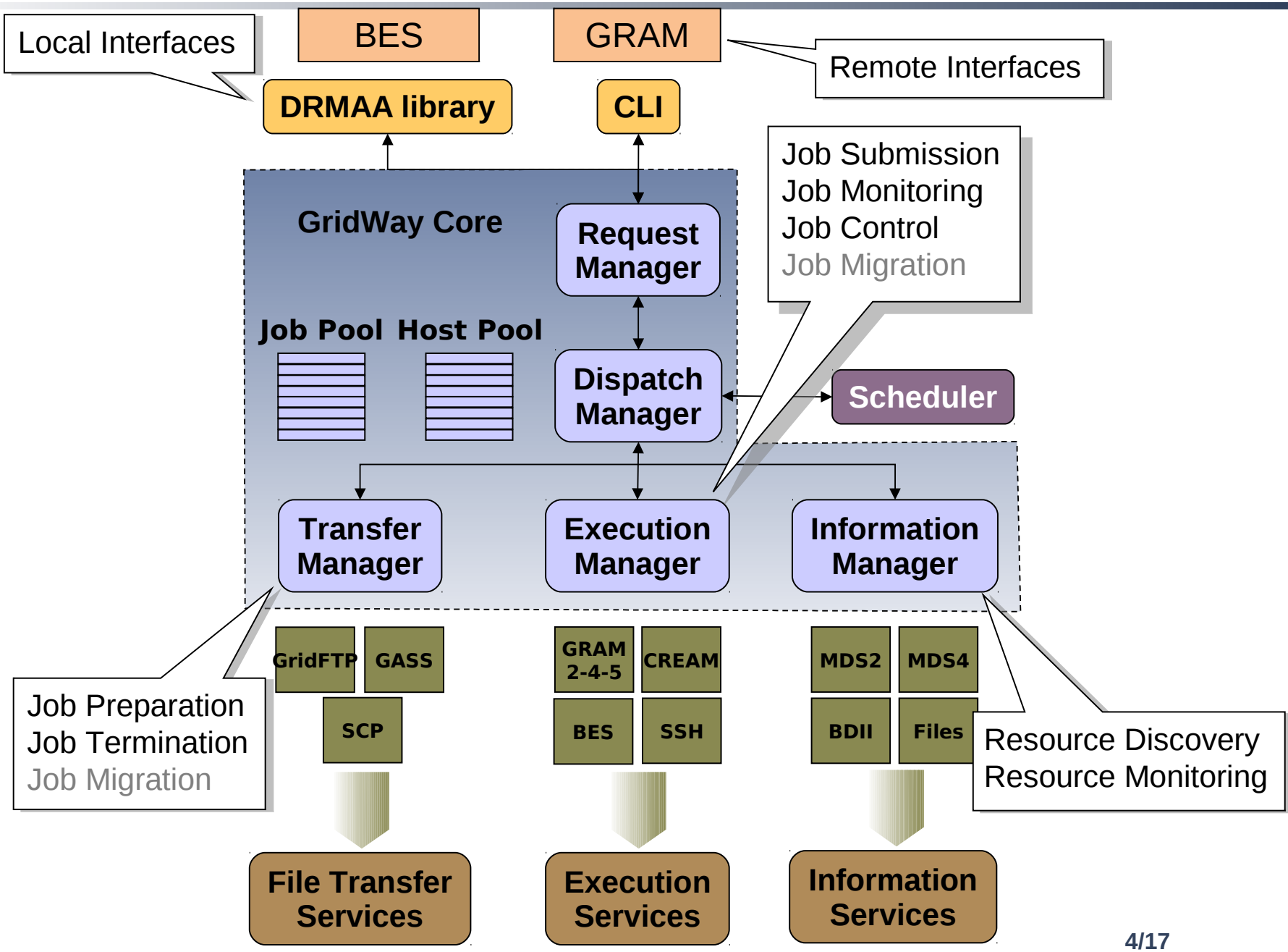
- The GridWay metascheduler enables large-scale, reliable and efficient sharing of computing resources over different grid middleware, providing a single point of access for them

- GridWay provides a LRM-like CLI for submitting, monitoring, synchronizing and controlling jobs

- GridWay implements the OGF standard DRMAA API, assuring compatibility of applications with LRM systems that implement the standard

- GridWay provides BES- and GRAM-compliant interfaces, enabling the submission and monitoring of jobs through a standard interface

Introduction



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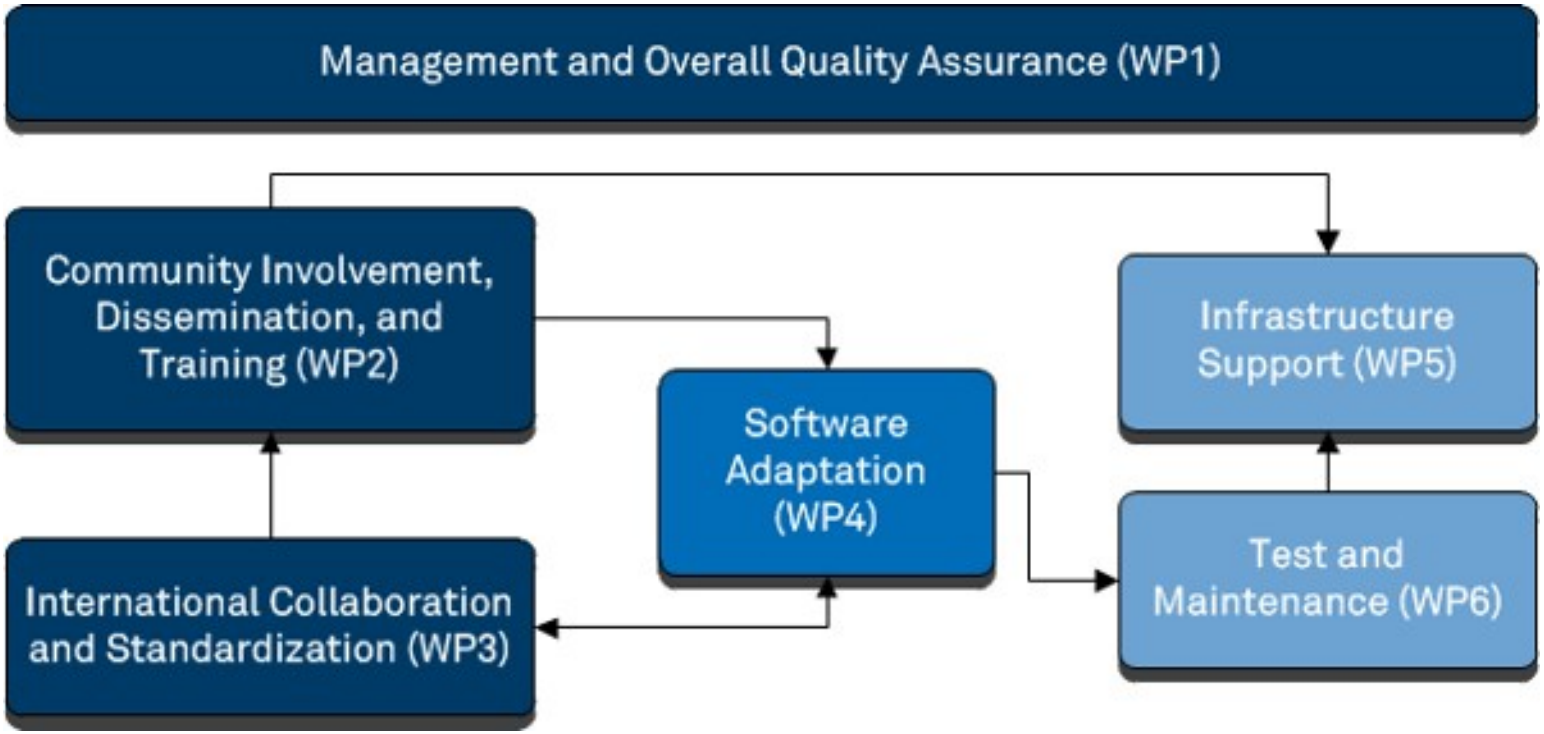
Initiative for Globus in Europe

- The IGE project is a EU FP7 project to coordinate European Globus activities
- Main objectives:
  - Support the European computing infrastructures and their users
  - Provide a central point of contact in Europe for Globus
  - Strengthen the influence of European developers and users on the development of Globus
- IGE serves as a comprehensive service provider for the European e-infrastructures regarding the development, customization, provisioning, support, and maintenance of components of the Globus Toolkit

Work Plan


Management and Overall Quality Assurance (WP1)
Community Involvement, Dissemination, and Training (WP2)
Software Adaptation (WP4)
Infrastructure Support (WP5)
International Collaboration and Standardization (WP3)
Test and Maintenance (WP6)

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Execution Drivers

- GridWay is now able to interface with computing resources managed by CREAM (Computing Resource Execution And Management) and BES (Basic Execution Service), through two new execution drivers

- CREAM is the gLite service for job management operation at the computing element level. BES specification defines Web Services interfaces for creating, monitoring, and controlling computational entities

- Drivers provide an abstraction layer that enables users to submit jobs to gLite 3.2 infrastructures and BES interfaces, and control and monitoring the execution of jobs

Execution Drivers

- They implement basic operations to interface with these Grid Services: INIT, SUBMIT, POLL, RECOVER, CANCEL and FINALIZE

- GridWay core calls these driver operations by means of the EM module, hiding the service implementation details

- GridWay core schedules synchronous polling operations in order to track the job status and control when the job execution is finished. CREAM driver receives notifications about the job state changes by means of asynchronous callbacks

Execution Drivers

- CREAM accepts jobs submissions described using JDL. BES uses JSDL to define job activities. GridWay core automatically translates its job templates to JDL and JSDL.

- Both drivers can be used with the Transfer and Information drivers for performing all stages during the job life-cycle

- Drivers provide a higher level of interoperation with grid infrastructures, responding to the need to leverage existing infrastructures based on different grid technologies

Short Demo: Execution Drivers

- Create your proxy
- Use *gwhost* command to see available resources
- Describe the job. Create job templates:

```
EXECUTABLE = primes.exe
ARGUMENTS = 0 1000
STDOUT_FILE = stdout_file.${JOB_ID}
STDERR_FILE = stderr_file.${JOB_ID}
RANK = CPU_MHZ
REQUIREMENTS = LRMS_NAME= "bes-pbs"
```

```
EXECUTABLE = primes.exe
ARGUMENTS = 0 1000
STDOUT_FILE = stdout_file.${JOB_ID}
STDERR_FILE = stderr_file.${JOB_ID}
RANK = CPU_MHZ
REQUIREMENTS = LRMS_NAME= "cream-pbs"
```

- Use *gwsubmit* command to submit jobs:

```
$ gwsubmit -t primes_bes.jt
```

```
$ gwsubmit -t primes_cream.jt
```

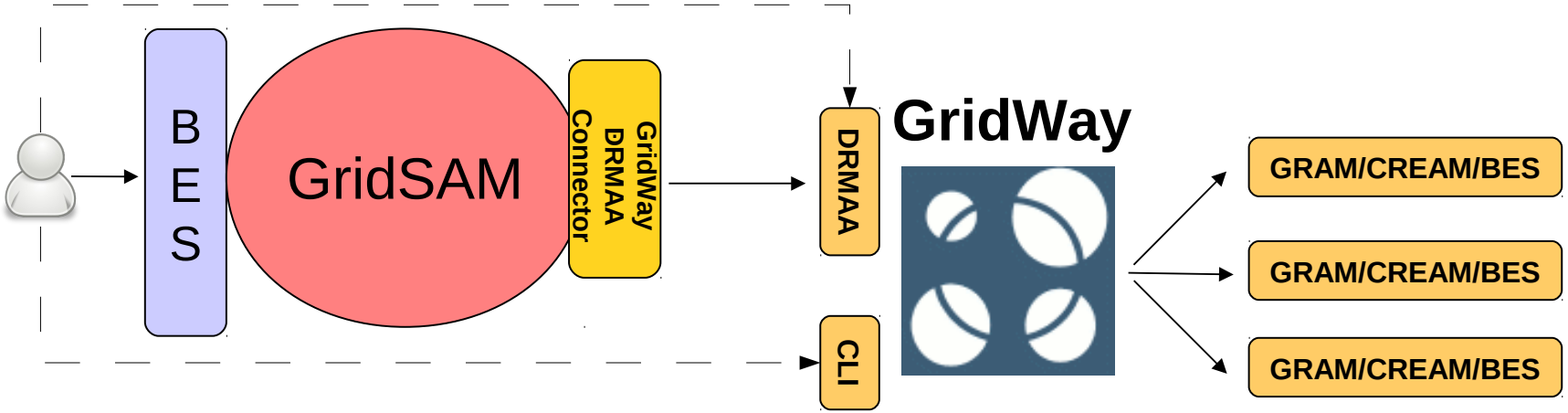
- Check the resources that match job requirements with *gwhost -m <job_id>*
- Follow the evolution of the jobs with *gwps* command
- See the job history with *gwhistory* command
- Check the results!

BES Interface for GridWay

- GridWay provides support for the BES standard both as a client and as a server, through the BES Execution driver and the BES Interface for GridWay
- BES interface for GridWay enables the remote access to GridWay's metascheduling capabilities through a standard interface, allowing users to access services provided by different grid middlewares
- It provides a standards-based gateway to otherwise non-interoperable Grid infrastructures
- Based on GridSAM
    - It provides a job submission interface for submitting computational jobs to many commonly used distributed resource management systems
- The GridWay connector for GridSAM has been developed which allows the interoperation between both systems. Communication is based on the DRMAA API

BES Interface for GridWay

- Jobs are submitted to a BES endpoint and are managed, monitored and executed as usual
- Jobs are described in JSDL
- GridWay connector submits the job to a GridWay instance, which provides access to different middlewares, and controls the job execution
  - Translates the JSDL to a GridWay Job Template



Developments in IGE

Other Developments in IGE

- Support for DRMAA2 (by Uppsala University)
- New installation procedure
  - Core and drivers are built and installed independently
  - FHS-compliant installation
- Logging with syslog
- Adaptation of the scheduler to submit jobs to resources based only on their rank, not on their free slots
- Set resource requirements in job templates
  - Maximum CPU time, maximum memory, etc.
- Randomized job state polling to avoid saturation due to multiple simultaneous requests
- Disposing jobs when they have finished the execution

Useful Links

- **The GridWay Project:** http://gridway.org/
- **GridWay Development:** http://dev.gridway.org/
- **Documentation:** http://gridway.org/doku.php?id=documentation
- **Support:** http://gridway.org/doku.php?id=support
  - User discussion: gridway-user@globus.org
  - Announcements: gridway-announce@globus.org
- **The IGE Project:** http://www.ige-project.eu/
- **BES Interface for GridWay:** http://www.gridway.org/doku.php?id=ecosystem:gridwaybes

Thank you for your attention!