Online Steering in gLite with RMOST

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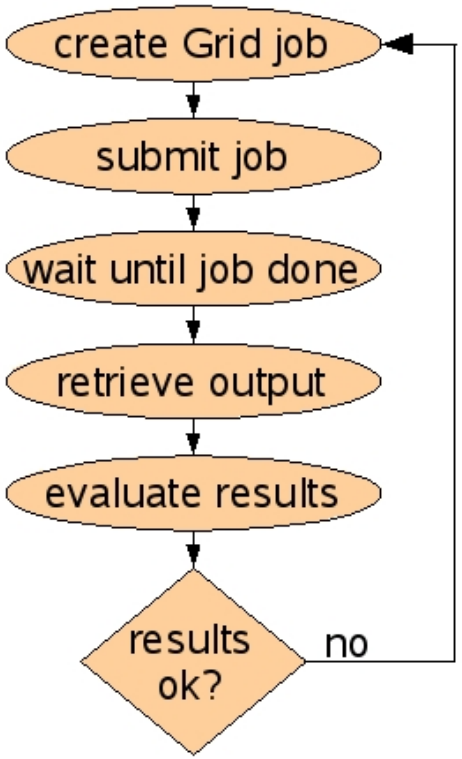
Overview

- Introduction
- Functionality
- RMOST components
  - Steering library
  - File access library
  - Grid connection
- Summary

Online Steering

Usage cycle of Grid jobs



- Online steering
  - Create interactive connection to running job
  - Online monitoring of intermediate results
  - Interactive control of the job
- Advantage:
  - Usage of less resources
  - Accelerate scientific cycles
  - Immediate reaction on changes

RMOST

- RMOST is a **R**esult **M**onitoring and **O**nline **S**teering **T**ool
  - Supports jobs of the LHC experiment ATLAS.

- Application **independent** implementation.
- **Thin interface** layer to ATLAS specific software.
- Basic functionality can be used **without** source code **changes** of ATLAS software.
- Visualization with plug-ins to **common** physics tools.

- **Minimize** instrumentation effort to enable steering.

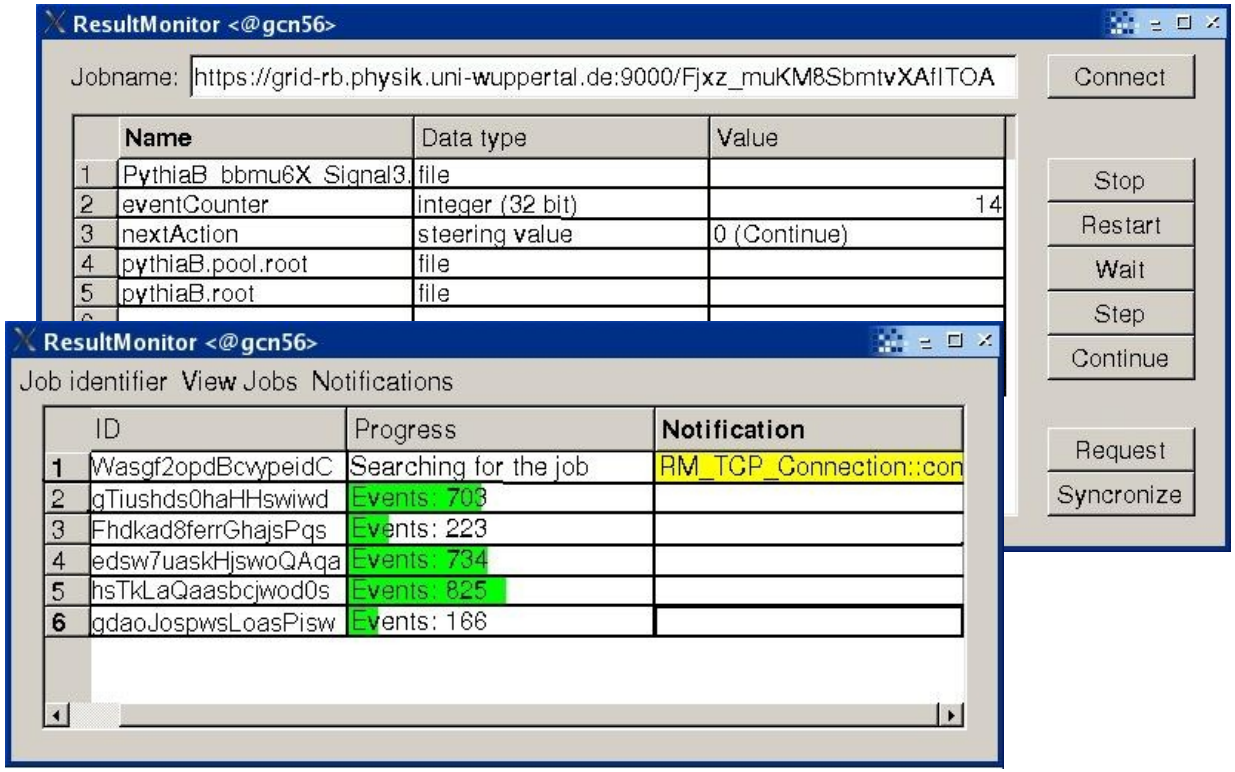
RMOST Functionality (1)

- Basic functionality
  - Can be applied **without** source code **changes**
  - **Visualization** of intermediate results in files
  - Monitoring of job **progress**
  - **Modification** of job description file. Application of the modification via restart of the job without resubmission of the job
  - **Control** of job execution: terminate, restart, suspend, continue, stepwise execution
  - Optional **delay, notification, and interaction possibility** after unexpected, graceful termination of the job
  - Optional notification on job start and end.

RMOST Functionality (2)

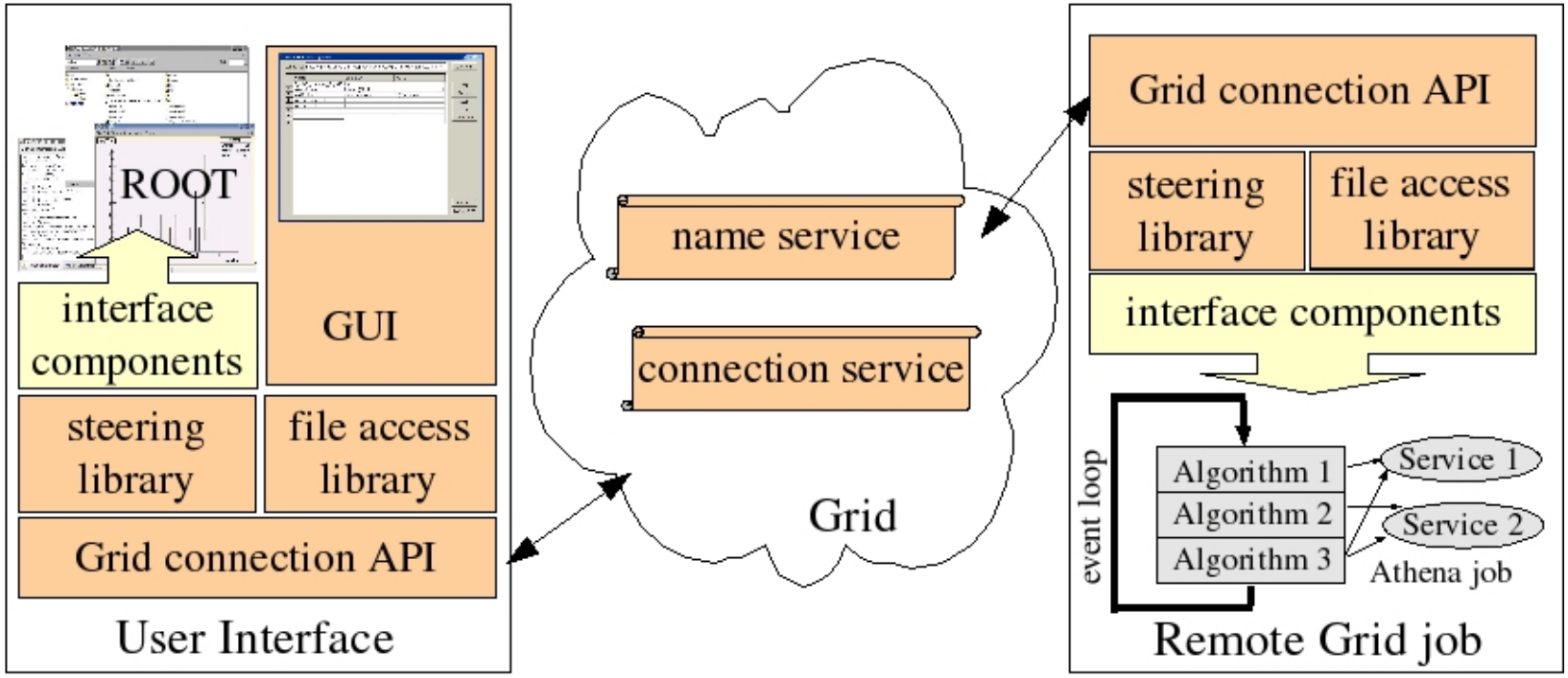
- Advanced functionality
  - Visualization of **internal** data and variables
  - Modification of data in **arbitrary** storage
  - Application of modifications at **any** time
  - **User defined** notifications on user defined conditions
  - **Preevaluation** of data
  - On demand execution of operations
- Notifications
  - Via steering tool
  - Via email if supported

Visualization



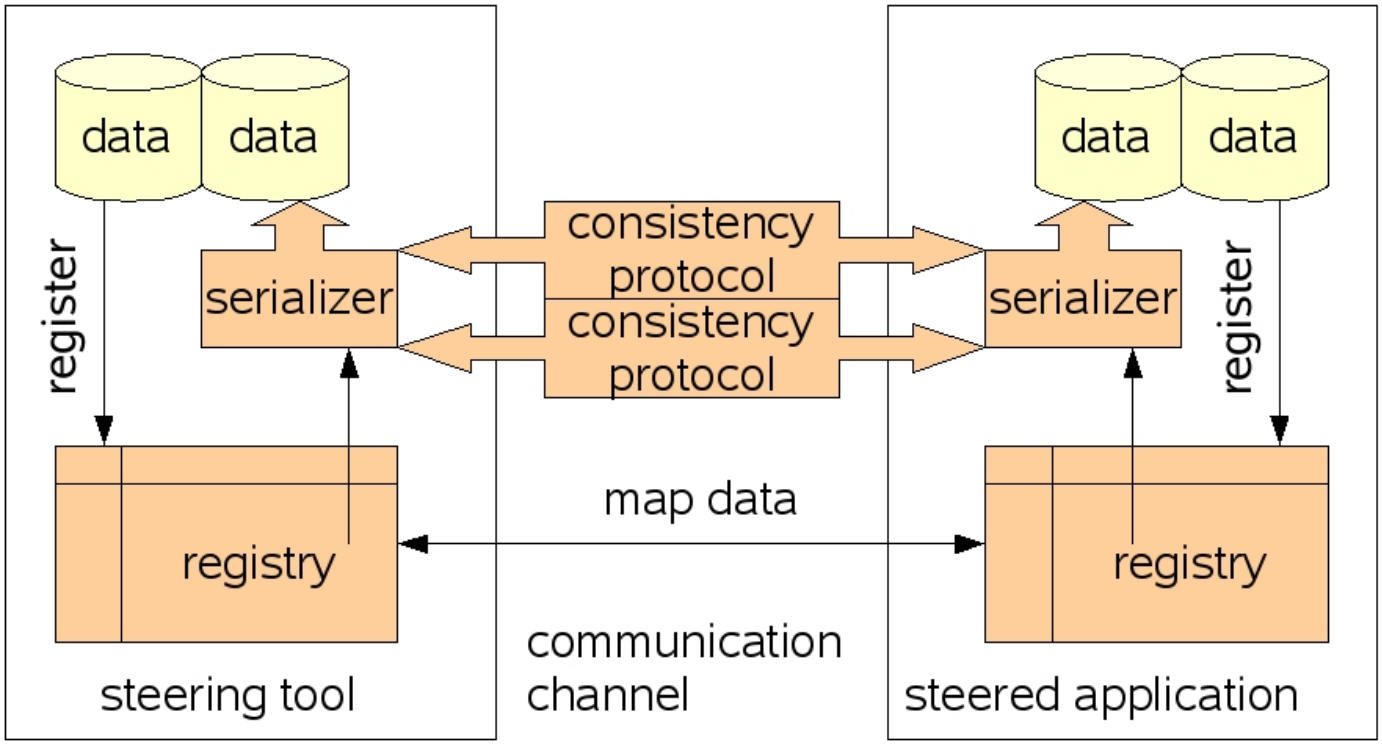
- Job management
- Connection to job
- Overview on job progress
- Detailed view of a job
- Display and modify values of basic data types
- Download and upload files

RMOST Components



- Main libraries are application independent
- Thin interface layer to ATLAS software
- Reusability of most components

Steering library

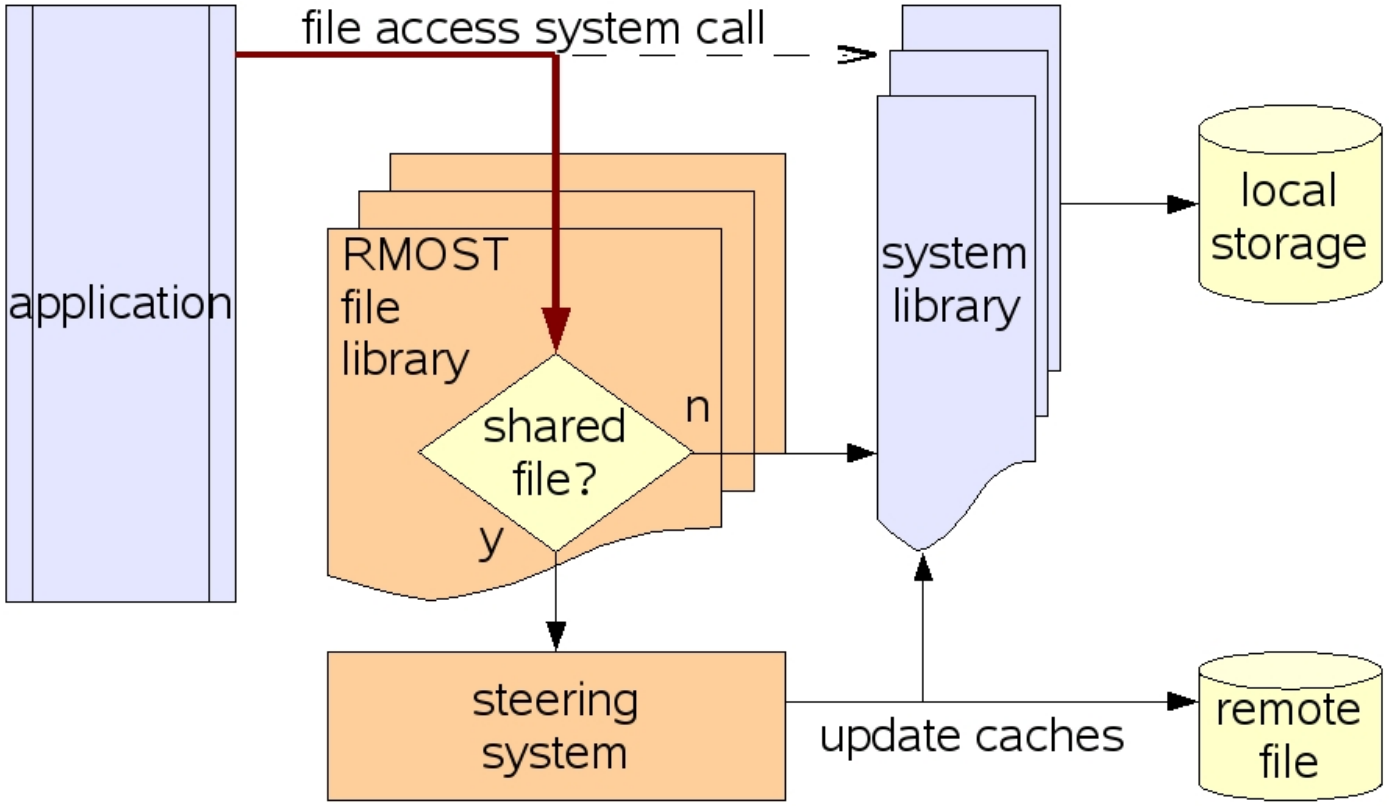


- Distributed shared memory model for steering
  - Data exchange at synchronization points
  - Asynchronous data exchange possible

Steering library

- Keep copies of data at both sides **consistent**
- Data must be registered
- Definition of synchronization points
  - Data is in a well **defined** state for visualization
  - **Safe** application of modifications
- Asynchronous data exchange possible
- **Extendable** with new data types
  - Requires provision of serializers
- **Notification** mechanism through:
  - Steering connection
  - Email, if supported

File Access library



- Preloaded library overwrites system calls for file access

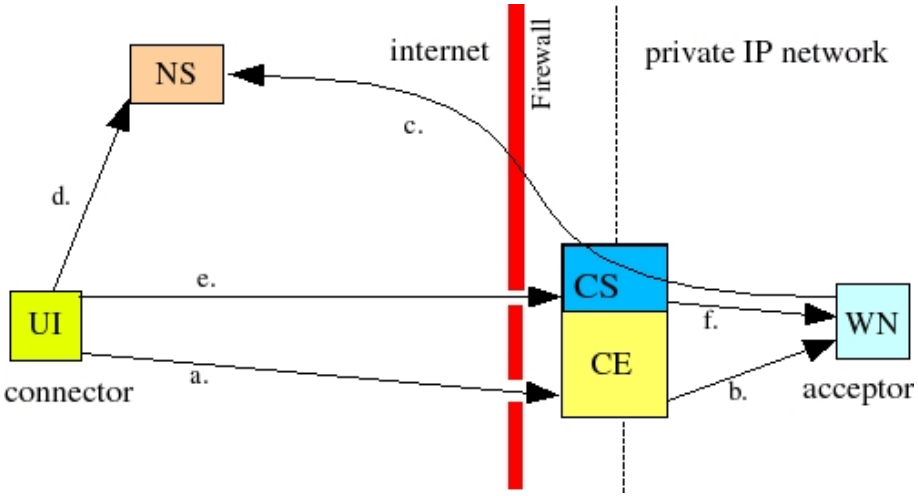
File Access Library

- Results are **often stored** in files
- **No serializers** necessary
- **No instrumentation** for each access

- Registration of files:
  - Via environment variable ⇨ **no** source code **changes** necessary
  - Via library call ⇨ **dynamic** registration during runtime of application

Interactive Grid Connection

- Connection required
- Initiated by the user
- Connection must be secure
- Job runs on unknown host



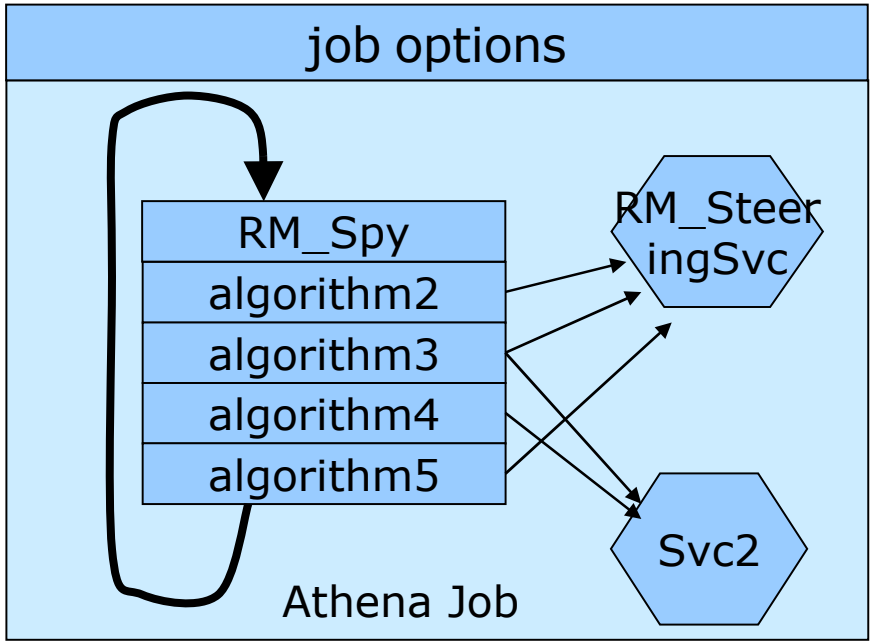
- Sites may be protected by firewalls
- Sites may have private IP networks
- Sites may have different configurations
- Configurations are unknown at submission time

Interactive Grid Connection

- Establishes an interactive connection to a Grid job in as many **cases** as **possible**.
- Uses job identifier as **address**
  - Uses R-GMA as name service
  - Want to exchange R-GMA
- Deals dynamically with **connectivity** problems due to:
  - firewalls
  - private IP networks
- Uses **GSSAPI** for authentication and authorization
  - Tested with gLite and Globus TK4
- Optional **encryption**

Integration in ATLAS Software

- Athena framework
  - Compose a job of Athena components
  - Configuration in job options
  - Users can add new components
- Basic functionality through an additional algorithm
- Advanced functionality through a service
  - Can be used by other components



Summary

- Application independent framework
- Thin application specific functionality

- Automated data exchange between job and steering tool
- Handles data consistency
- Special support for file access
- Interactive Grid connection