



Enabling Grids for
E-science in Europe

EGEE All Activities Meeting, 18th June 2004

JRA1 Middleware

<http://cern.ch/egee-jra1>

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on behalf of

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Outline

- Summary of work since Cork
 - Integration, Testing, Tools, Information Services, Data Management, Workload Management/Logging/Bookkeeping, Prototype
- Deliverable status
- Execution plan status
- Current & Planned WBS
- Products Overview
- Risk Analysis
- Issues related to other activities
- Risk Analysis
- Issues related to other activities
- High Priority Steps between now and Den Haag
- Hiring Status and Manpower level
- Scope & objectives of M3/4 deliverables
- Status of gLite prototype
- Next set of requirements
- Planning for DJRA1.2
- LCG & gLite

Summary of Work since Cork Integration

- Finalized the [SCM Plan](#)
- Started work on [Developer's Guide](#)
- First/Enhanced implementation of the SCM services:
 - [CVS](#) checks and notifications
 - Extended build framework to C/C++, autotools, Perl modules, started work on packaging and release tools
 - [Automated continuous integration system](#) (based on CruiseControl)
 - [Bug tracking system](#)
- Set up the build infrastructure
 - One continuous integration server per each major platform (RHEL 3.0, CEL3, Windows XP), one nightly build server (CEL3)
 - Tools for server management and OS installation in place
- Defined common [name and logos](#) for the product!!!

Summary of Work since Cork

gLite logo



Lightweight Middleware for
Grid Computing

Summary of Work since Cork

Testing

- Installation of distributed testing and validation testbed
 - Defined machine requirements based on agreed reference platforms
 - Currently: CERN: 12 machines, NIKHEF: 1 Machine, RAL: 1 machine.
- Deployment of prototype
 - A lot of work in understanding how to install and configure prototype
 - Now deployed on testbed with help from developers and working,
 - [Installation and configuration notes](#) produced.
- Testplan
 - In progress, First version to be released in June.
 - Much discussion on software testing metrics – [first list produced](#),
 - Glossary of terminology to be applied in EGEE produced,
 - Started to define criteria for a candidate release to be accepted into full testing
- Testing tools and frameworks
 - [Survey of interesting tools](#) carried out – with good input from LCG
 - [Small number of interesting tools](#) identified for further evaluation, being installed
- Test design and planning
 - Design of installation and configuration testing tools begun,
 - Coordination of unit testing procedures and processes in development clusters begun.
- CVS structure
 - CVS modules for testing defined and set up.

Summary of Work since Cork Information Services

- Getting code under SCM
- Developing web site
- Specification document - 1st draft
- New design almost complete
- Delivered code for first prototype with new API - but no matching documentation
- Contributed to the release plan
- Contributed to DJRA1.1

Summary of Work since Cork

Data Management

- Setting up the first prototype
 - RLS integration
 - SRM integration
- Build system
 - A lot of work together with integration team to have the build system ready
 - Defining modules and processes inside JRA1-DM
- Design and Planning
 - Detailed design of some components, fed into DJRA1.1
 - Data Management Contribution to Release plan
- Implementation
 - Started work on Replica Catalog, File Access Service, File Transfer Service.
- Evaluation/Testing of possible component candidates
 - Condor Stork
 - Jabber
 - AIO/GFAL
 - Databases

Summary of Work since Cork Workload Management

- Transition of common components of the EDG Workload Management and Logging and Bookkeeping systems to the EGEE CVS server, according to the Software Configuration Management (SCM) guidelines.
- Training: general for newcomers, Web Service technology.
- Development (see DJRA1.1) of the architecture of the services:
 - Workload Management Service (including Logging and Bookkeeping).
 - Accounting Service.
 - Resource Access (a.k.a. ‘Computing Element’) Service
 - Job Provenance Service

Summary of Work since Cork

Other

- A **First** Prototype Middleware on a testbed at CERN and Wisconsin delivered to ARDA on May 18, 2004 and to NA4/Biomed on June 15, 2004
 - Being integrated in SCM
 - Being used by Testing Cluster
 - Prototype GAS service
 - Using Integration tools
- Significant contribution from University of Wisconsin Madison on
 - Adapting the Grid Manager for interfacing to PBS/LSF
 - Supporting and debugging the prototype
 - Contributing to the overall design
 - Interfacing with Globus and ISI
- DJRA1.2: preliminary work performed in the MW working document

Status of Deliverables for M3 Indication for M4,5

Milestone	Month	Date	Description	Status
MJRA1.1	M3	06-2004	Tools for middleware engineering and integration deployed	OK.
MJRA1.2	M3	06-2004	Software cluster development and testing infrastructure available	Mainly OK JRA3 Status unknown
MJRA1.3	M5	08-2004	Integration and testing infrastructure in place including test plans (Rel 1)	On track

Deliverable	Month	Date	Nature	Description
DJRA1.1	M3	06-2004	(Document)	Architecture and Planning (Release 1)
DJRA1.2	M5	08-2004	(Document)	Design of grid services (Release 1)

Execution Plan status

- No progress on the text
- Work Breakdown Structure Updated
<https://edms.cern.ch/document/474422>
- Resource Plan updated
<https://edms.cern.ch/file/478383>

Current & planned WBS

- Updated WBS sent to Project Office
 - Restructured, in particular to have common tasks grouped together
- Details of ~65 tasks at

<https://edms.cern.ch/document/474422>

Products Overview

Tools

- Savannah project portal
 - Used for JRA1 coordination and for software project
 - Being tested also by JRA2
- Software packaging and distribution
 - Investigating software distribution and packaging in order to fulfill the needs experiments and users
 - Evaluated software for distribution and installation of external software
- QA reports
 - Improving the existing SPI QA reports in order to add the metrics required by the JRA1 quality plan and its quality indicators
- Others
 - dotProject server installed, available for some JRA1 packages. But is not going to be a public service provided by SPI
 - The person from EGEE for the QA tools and reports in SPI will only join in August 2004
 - Participated to certification of the new Linux platform
 - More information about other services is available on SPI (<http://spi.cern.ch>)

Products Overview

Integration

- **CVS**
 - Modules format agreed with dev clusters
 - Authorization mechanism in place
 - Notification mailing lists for each subsystem in place
- **Configuration and Build framework**
 - Strengthened naming conventions
 - Repository of external-dependencies set up and integrated in the build process
 - Common build targets extended to C/C++ with custom tools for managing autotools-based components and Perl modules
 - First version of an automated RPM packager developed and being tested
- **Continuous Integration System**
 - CruiseControl installed on a test server
 - Entire system built every 60 minutes
 - Developers are automatically notified if their modifications cause the build to fail
 - Build status, errors, unit test reports and CVS logs available on the web in a single place and continuously updated
- **Bug tracking system**
 - Implemented in Savannah with all required fields (category, severity, priority, etc) . Being actively used
- **Some metrics**
 - 1 system (gLite)
 - 5 subsystems (Alien, Data, R-GMA, Security, UI, WMS)
 - 37 components

Automatic Build System Preview



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Project	Last build result	Last build time
org.glite	passed	14/06/2004 10:41:38
org.glite.rgma	passed	14/06/2004 10:43:56
org.glite.rgma.base	passed	10/06/2004 18:51:56
org.glite.data	passed	14/06/2004 10:43:05
org.glite.data.catalog-interface	passed	10/06/2004 23:57:17
org.glite.data.catalog-service-fr	passed	14/06/2004 08:01:07
org.glite.rgma.api-java	passed	10/06/2004 21:54:48
org.glite.wms	passed	14/06/2004 10:43:20
org.glite.wms.thirdparty-globus_ssl_units	passed	10/06/2004 21:55:23
org.glite.wms.thirdparty-globus_gridftp_server	passed	10/06/2004 21:55:35
org.glite.wms.thirdparty-bypass	passed	10/06/2004 21:55:58
org.glite.wms.thirdparty-loki	passed	10/06/2004 21:55:48
org.glite.wms.common	passed	10/06/2004 17:58:20
org.glite.wms.tls	passed	11/06/2004 13:11:06
org.glite.wms.jobid	passed	11/06/2004 13:11:56
org.glite.wms.idl	passed	11/06/2004 14:12:55
org.glite.wms.idlj	passed	11/06/2004 08:00:06

Products Overview

Testing

- **Test cases**
 - Many test cases will be written to test the functionality of the middleware,
 - Test case library will be produced,
 - Everything in CVS following SCM processes (where appropriate)
- **Test suites**
 - Based on application use cases and functional requirements,
 - Built from the many test cases in the test case library,
 - To be released to SA1.
- **Test reports**
 - Automatically generated from running test suites,
 - Stored in CVS for all candidate releases deployed on testbed.

Products Overview Information Services

- R-GMA with new API
- Much reduced schema in use

Products Overview

Data Management

- **Storage Element**
 - SRM interface
 - Posix I/O interface
 - Supports some protocols (bbftp, https, ftp, gsiftp, rfio, dcap, aioid, ...)
- **Site transfer queue**
 - Manages the transfers to a site. This is equivalent to the batch queues on some local farms, this service actually manages a resource: the network.
 - Policies concerning network usage can be specified here (i.e. max bandwidth to be used by certain organisations)
- **VO transfer queue**
 - Fetch scheduled transfers targeting this site from the VO scheduler and put them into the site transfer queue.
 - Enforce VO policies concerning the local storage
- **VO Data Scheduler**
 - This is the top-level scheduler for data transfers. There may be many such schedulers.
- **Data Placement Optimizers**
 - Based on the list of planned transfers optimize the source, the network, check target space, resolve logical names, etc.
- **Data Placement Policy Enforcers**
 - Modify the list of the scheduler based on various policies, like exclusion of certain targets
- **Event-based schedulers**
 - Put entries in the scheduler based on some triggering event (time, monitoring events)

Products Overview

Workload Management System

- Workload Management Service (including Logging and Bookkeeping).
- Accounting Service.
- Resource Access (a.k.a. 'Computing Element') Service
- Job Provenance Service

Products Overview

Other

- Package Manager
- Grid Access Service

Concerns & Risks (I)

- How to ensure right level of commitment by all partners
 - In particular when they are not directly funded
- How to avoid independent development lines
 - LCG and EGEE both “develop” middleware
- How to ensure rapid development cycles
 - Needed to validate directions taken
- Timescales
 - LCG need something by the end of the year with interim releases starting from the summer
- Biomedical (and others) requirements
 - Security requirements may complicate considerably overall architecture
- Building prototypes from disparate building blocks
 - With requirements of production quality software process
 - Different Security Models

Concerns & Risks (II)

- Fast prototyping might be conflicting with formal SCM practices
- Building an effective team out of disparate resources
- Convergence with standards and timescales
 - WSRF not yet approved, LCG needs to take decision in 2005
- Keeping personnel towards end of project
- Coexistence with multiple Grids
 - Seems OK for Job Submission, more tricky for data
- Aggressive timelines may affect quality
 - Software Engineering and in particular Testing & Integration
- Multiple reporting lines, coordination meetings, etc...
 - Generating overheads

Issues related to other Activities (I)

- JRA3
 - Security Components Integration
 - Choice, version and status of external security libraries is still unclear
 - Adapting the existing security components to SCM takes time
 - Discussions ongoing in Security Team
 - Testing
 - Unit testing procedures to be agreed together with JRA1 developers and described in Developers Guide
 - Help needed from JRA3 to design security testing
 - Data Management
 - Model of authorization management in the services unclear
 - Libraries for the transport-layer GSI security stack needed
 - Server-side libraries to do the authorization and delegation are needed
 - discussions ongoing in Security Team
 - Workload Management System
 - Solutions for authentication, transport- and/or message-level web service security

Issues related to other Activities (II)

- **JRA4**
 - Training on SCM and common integration tools is required
 - Unclear what software products are to be expected
 - Ideas on network element unclear
 - Timelines how to be integrated unclear
 - Discussions happened this week with JRA4
- **SA1**
 - Platform requirements being finalized now
 - Installation and configuration requirements still unclear
 - Release process of periodic baselines and certification loop still to be discussed
 - Coordination of testing activities to minimize duplication and benefit from each others testing

Issues related to other activities (III)

- NA4
 - Testing
 - Test team will use our testbed for testing
 - Will contribute to design and implementation of common test suites
 - How we will work together to be defined
 - Data Management
 - Requirements are expected after the first round of prototype testing
 - Scheduled discussions with Bio-Medical people
- Project wide
 - Coordination of the many testing activities to minimize duplication and collaborate

High priority steps between now and Den Haag - Integration

- Produce, agree and distribute the Developer's Guide with instruction about using the configuration and build systems, coding guidelines, unit tests requirements, etc.
- Adapt all software components to SCM according to the release plan and monitor compliance
- Put the continuous integration system in full production state
- Put in the place the periodic release mechanism: goal is to produce one integrated system baseline per week
- Analyze the system configuration requirements, harmonize configuration models across the various components and subsystems, adapt them to "customer" requirements

High priority steps between now and Den Haag - Testing

- Release of test plan document
- Finalize machine requirements for the rest of the year
- Complete deployment of distributed testing infrastructure
- Deploy prototype across full distributed testbed and set up many VO's for testing.
- Finalize decision on tools to be adopted and deploy
- Setup automatic release installation and configuration system for testbed
- Design and implementation of test cases/suites
- Automate test suites and integrate as much as possible into the build
- Start testing !

High priorities steps between now and Den Haag - Services

- Continue move into EGEE CVS and the SCM procedure of any existing code that can be used to prototype and/or implement the required services.
- Prototype - close the loop with ARDA
 - Get feedback from experiments, and agree on priorities
 - Get feedback from biomedical, and agree on priorities
- Deliver DJRA1.2 – Design of Grid Services
- Implement Release Plan
- Security Design has to be finalized in the Security Team
- Security components have to be integrated

High priority steps between now and Den Haag - Prototype

- Integration to SCM
- Establish complete development cycle
- Integration of the EDG WMS
- Initiate Package Manager development
- R-GMA for service monitoring and discovery
- Initiate Controller Service development
- Definition of API for HEP Analysis & production
- Implementation of agreed security model
- User documentation
- Deliver relevant prototype components to Operations
 - Integrate in preproduction service

Hiring Status & Manpower level

Partner	FTE ¹	MM	Assigned ² To Hire ²	FTE from TA ²	Deviation
CERN	20.3	244	19.3	32	95%
RAL (CCLRC)	9.0	108	8	8	89%
INFN	23.0	276	21	16	91%
DATAMAT	5.3	63	4	6	76%
CESNET	4.4	53	4.4	4	100%
CNRS	2.0	24	1	2	50%
Total effort	64.0	768	57.7	68	90%
Resource Plan indicator					
Hired or assigned up now					57.7
Total FTE from TA					68.0
Recruitment indicator					90%
Still to hire					6.3
1: People planned & assigned to work					
2: Head count					

Scope & objectives of M3/4 deliverables

- DJRA1.1 – Middleware Architecture & Timescales
 - Describe the architecture and the proposed components for the Grid Services
 - Describe the planned work for those components
 - Describe a time table for this components
- DJRA1.2 – Design of Grid Services
 - Describe the implementation of the proposed services identified in DJRA1.1
 - Provide Interfaces (API and WDSL) and semantics for those services

Status of gLite Prototype

- A **Initial** Prototype Middleware on a testbed consisting of
 - AliEn “shell”
 - Job submission:
 - Alien CE->Condor-G->blahp->PBS/Condor
 - Globus Gatekeeper
 - Data Management
 - File catalog
 - Service factored out of Alien, Web Service interface; WSDL to be done
 - Castor & D-Cache SE with SRM
 - gridFTP for transfers
 - AliEn FTD
 - Aiiod/GFal investigations
 - RLS (EDG)
 - Perl RLS Soap interface for File Catalog integration
 - Not used yet
 - Security
 - VOMS for certificate handling/SE gridmap files (NIKHEF)
 - MyProxy for certificate delegation in GAS
 - GAS (Grid Access Service)
 - Prototype with a few file cataloging/RLS functions
 - R-GMA
 - With new API; not used yet
- Being integrated in SCM

Next set of components to be added or changed

- **Workload Management**
 - Initial prototype WMS components supporting job submission and control, the handling of data requirements via RLS and POOL catalog queries, the ability for CEs to 'request' jobs, all while keeping LCG-2 compatibility.
- **Information Services**
 - R-GMA with new API
 - Redesign of Service/ServiceStatus tables and publishing mechanism
- **SE**
 - Finish File I/O design, integrate of AIO and GFAL with the security libraries, first prototype I/O system
- **File Transfer Service**
 - Integrate Condor Stork soon (needs to implement SRM interface)
- **File Catalog**
 - WSDL interface, clients in other languages
- **Replica Catalog**
 - Re-factored RLS, integrated with File Access Service
- **Metadata Catalog**
 - Initial implementation ready to be integrated in two weeks
- **Grid Access service security model**

Planning for DJRA1.2

- Not really started yet although elements in the Middleware working documents

LCG-2 & gLite

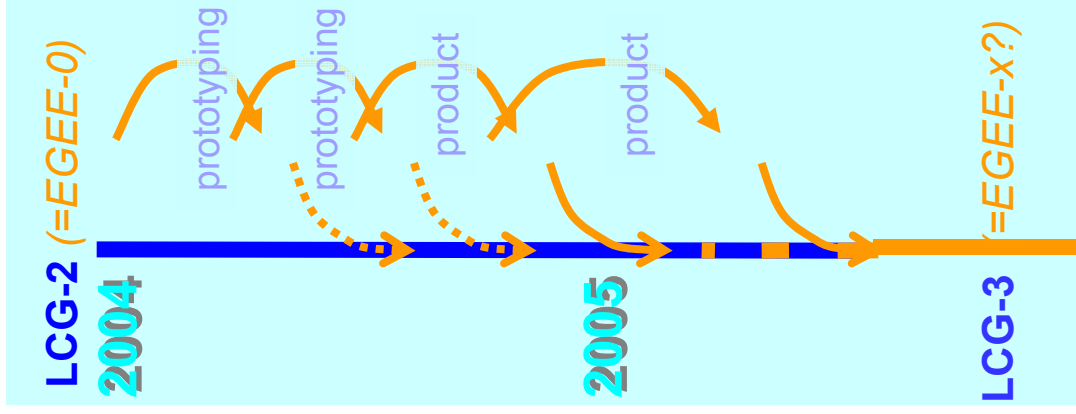
- gLite
 - Focus on analysis; strongly influenced by the ARDA RTAG
 - Starts with components from AliEn, EDG, VDT and other projects
 - Aim at addressing advanced requirements in particular from BioMedicals
 - Prototyping short development cycles for fast user feedback
 - From ARDA & BioMedicals; first iteration next week
 - Aim at delivering components compatible with LCG-2 wherever appropriate
 - Will publish WDSL & semantics
- SA1 Preproduction Service
 - Starts with LCG-2 Code base
 - Home for new development/reengineering required from LHC data challenges experiences
 - Validation in particular by ATLAS/CMS current analysis tools
 - Certification of promising selected components from gLite
 - Provided they satisfy Operations requirements
- LCG-2
 - Current base for **production** services
 - Evolved with certified new or improved services from the preproduction

LCG-2 and gLite Timescales

LCG-2

focus on production, large-scale data handling

- The service for the 2004 data challenges
- Provides experience on operating and managing a global grid service
- Strong development programme driven by data challenge experience
- Evolves to LCG-3 as components progressively replaced with new middleware



Next generation middleware
focus on analysis

- Developed by EGEE project in collaboration with VDT (US)
- LHC applications and users closely involved in prototyping & development (ARDA project)
- Short development cycles
- Completed components integrated in LCG-2