http://cern.ch/arda

"ARDA status"

Dietrich Liko / CERN

www.eu-egee.org   cern.ch/lcg

EGEE is a project funded by the European Union under contract IST-2003-508833

Overview

- The EGEE project

- ARDA in a nutshell
  - Experiments
  - Middleware

- Highlights from the 4 experiment prototype
 - CMS, ATLAS, LHCb and ALICE

- ARDA-related workshops

- Conclusion

The EGEE project

- Create a European-wide Grid **production** quality infrastructure for multiple sciences

- Profit from current and planned national and regional Grid programmes, building on
    - the **results of existing projects** such as DataGrid (EDG), LCG and others
    - EU Research Network and industrial Grid developers

- Support Grid computing needs common to the different communities
    - **integrate** the computing infrastructures and agree on **common access policies**

- Exploit International connections (US and AP)
    - Provide interoperability with other major Grid initiatives such as the US NSF Cyberinfrastructure, establishing a **worldwide Grid infrastructure**

- Leverage national resources in a more effective way

- 70 leading institutions in 27 countries (including Russia and US)
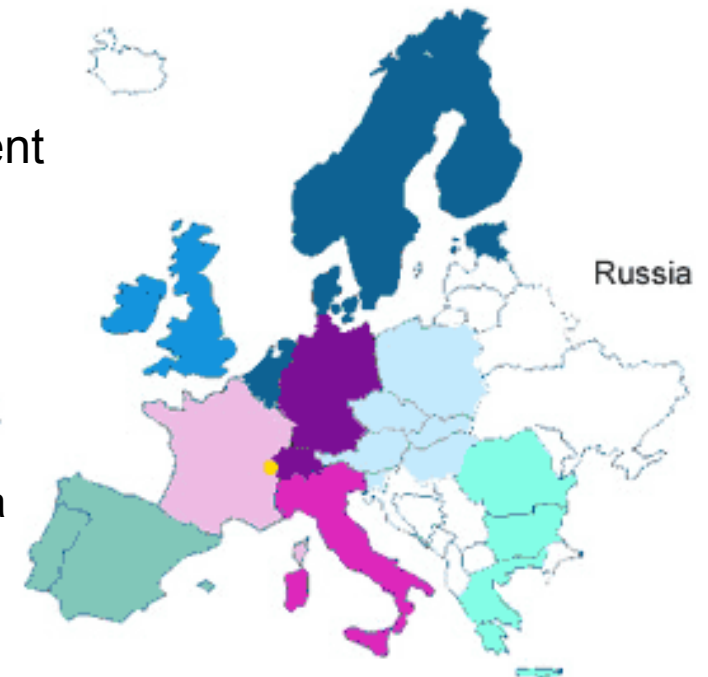
EGEE and LCG

- Strong links already between EDG and LCG. It will continue in the scope of EGEE
- The core infrastructure of the LCG and EGEE grids will be operated as a single service
  - LCG has many US and Asia partners
  - EGEE includes other sciences
  - Substantial part of infrastructure common to both
- Parallel production lines
  - LCG-2: 2004 data challenges
  - EGEE Prototype of new MW

- ARDA playground for the LHC experiments
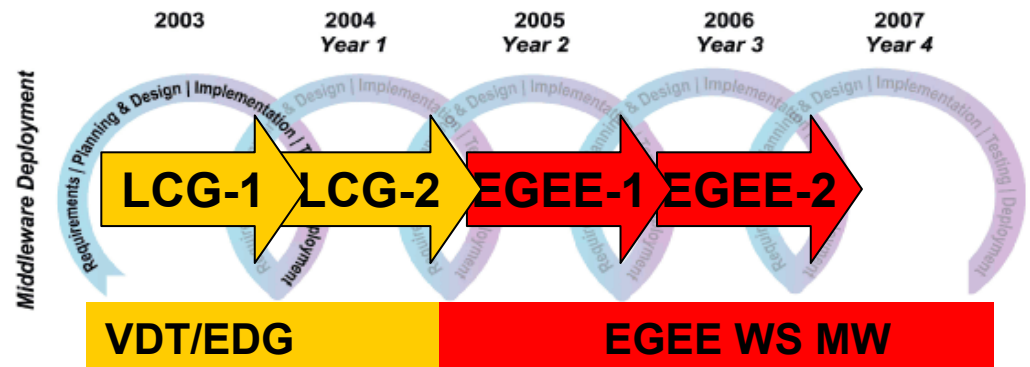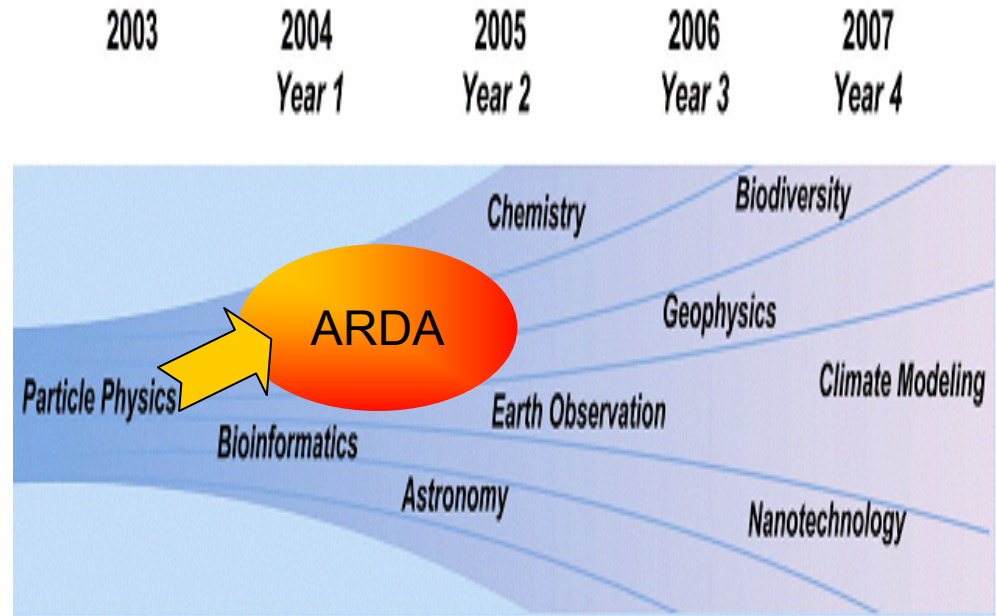
Starting point for ARDA

- New service decomposition
  - Strong influence by the Grid system developed by the ALICE experiment, Alien and used by a wide scientific community (not only HEP)

- Role of new technology, experiences of the past …
  - Web service framework

EGEE Middleware

- Interfacing of middleware for use in the experiment frameworks
  - Systems are already in use today

- Early deployment of (a series of) prototypes
  - functionality and coherence

ARDA project

ARDA in a nutshell

- ARDA is an LCG project
  - main activity is to enable LHC analysis on the grid

- ARDA is contributing to EGEE NA4
  - uses the entire CERN NA4-HEP resource

- Work is based on last years experience/components
  - Grid projects (LCG, VDT, EDG …)
  - Experiments middleware/tools (Alien, Dirac, GAE, Octopus, Ganga, Dial,…)

- Interface with the new EGEE middleware (gLite)
  - Use the grid software as it matures
  - Key player in the evolution from LCG2 to the EGEE infrastructure
  - Verify the components in an analysis environments
  - Provide **early and continuous** feedback

ARDA and HEP experiments

- Interface with the HEP Experiments
  - Every experiment has different implementations of the standard services
  - Help in adapting/interfacing (direct help within the experiments)

- Move from current production environments …
  - Few expert users
  - Coordinated update and read actions
  - Used mainly in so-called data challanges

- …to an analysis environment
  - Many users (Robustness might be an issue)
  - Concurrent "read" actions (Performance will be more and more an issue)
  - Used by all physicists for their analysis

Working model

- Development of one prototype per experiment
  - ARDA emphasis is to enable each of the experiment to do its job
  - A Common Application Layer *might* emerge in future

- Provide a forum for discussion
  - Comparison on results/experience/ideas
  - Interaction with other projects
  - …

- Organizes workshops for interaction with community

ARDA team

- Massimo Lamanna
- Birger Koblitz

- Derek Feichtinger
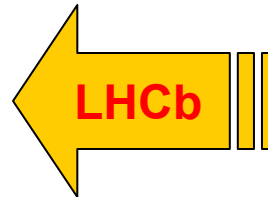- Andreas Peters **ALICE**

- Dietrich Liko
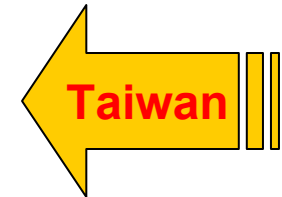- Frederik Orellana **ATLAS**

- Julia Andreeva
- Juha Herrala **CMS**

- Andrew Maier
- Kuba Moscicki **LHCb**

- Andrey Demichev
- Viktor Pose **Russia**

- Wei-Long Ueng
- Tao-Sheng Chen **Taiwan**

Experiment interfaces

Piergiorgio Cerello (ALICE)
David Adams (ATLAS)
**Lucia Silvestris (CMS)**
Ulrik Egede (LHCb)

Milestones

End-To-End Prototype activity

Milestone	Date	Description
1.6.18	Dec 2004	E2E prototype for each experiments (4 prototypes), capable of analysis (or advanced production)
1.6.19	Dec 2005	E2E prototype for each experiments (4 prototypes), capable of analysis and production

Middleware architecture

- Many components
- User access by GAS

Middleware Prototype
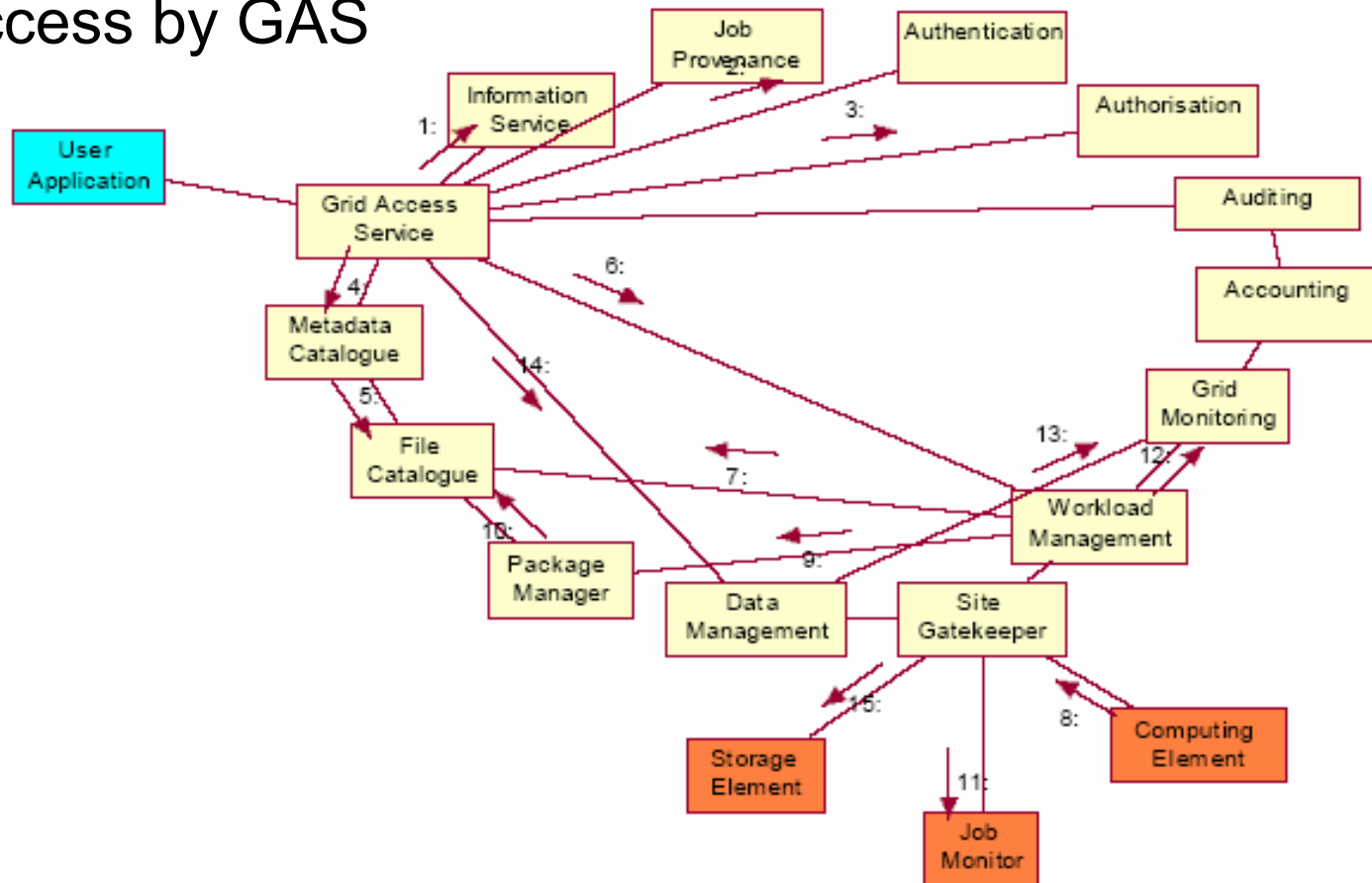
VOMS/myProxy
(lxn5210)

Database, proxy, ldap
(lxn5220)

CE (lxn5210)

WN (lxn5211)

GAS
(lxn5216)

Core services
(lxn5219)
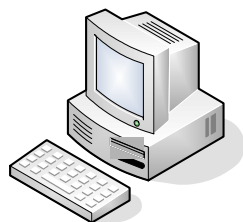
SE dCache
(lxn5208)

SE Castor
(lxn5209)

Source: http://egee-jra1.web.cern.ch/egee-jra1/Prototype/testbed.htm

Middleware Prototype

- Available for us since May 18th

  - In the first month, many problems connected with the stability of the service and procedures

  - At that point just a few worker nodes available

  - A second site (Madison) available since end of June

  - CASTOR access to the actual data store

- No. of CPUs will increase

  - 50 as a target for CERN, hardware available

- Nr. of sites will increase

- Main component: GANGA
  - GUI access to the Grid
  - Enable physicists to analyze the data being produced during 2004 for their studies
  - It naturally matches the ARDA mandate
  - Deployment of the prototype where the LHCb data will be is essential (CERN, RAL, …)

- At the start the emphasis is to validate the tool
  - Focus on overall usability
  - Splitting and merging functionality for users jobs

- DIRAC (LHCb production grid)
  - Convergence with GANGA / components / experience
  - Submit jobs to DIRAC using GANGA

GANGA
Gaudi/Athena aNd Grid Alliance

- Gaudi/Athena: LHCb/ATLAS frameworks

- Single "desktop" for a variety of tasks

- Help configuring and submitting analysis jobs

- Keep track of what they have done, hiding completely all technicalities

LHCb
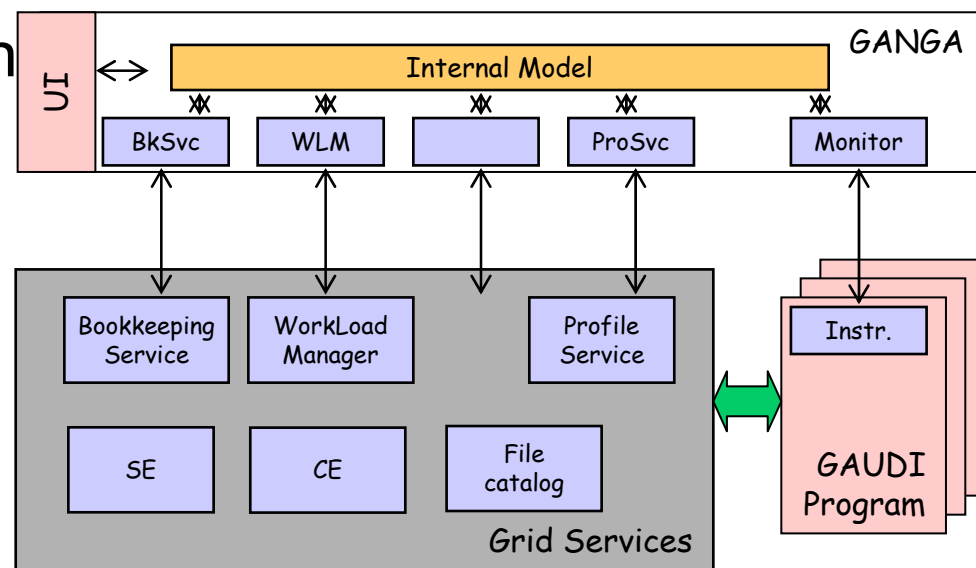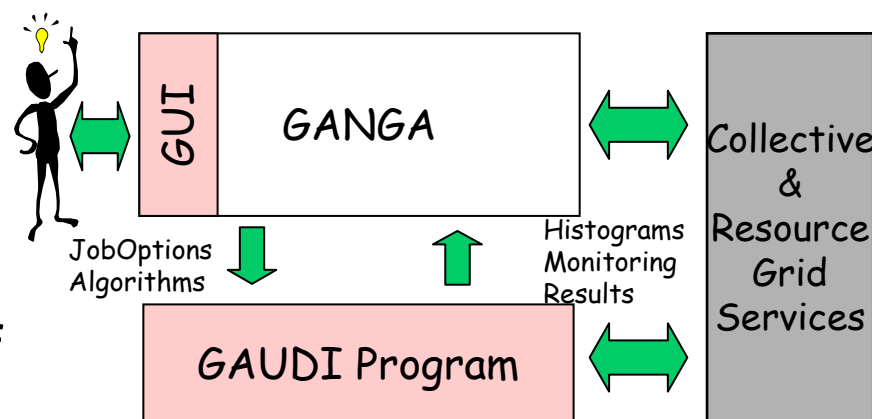
- ## Use of the gLite testbed
  - Simple DaVinci jobs from GANGA to gLite
  - "Regular" DaVinci jobs onto gLite

- ## Other contributions
  - GANGA interface to Condor (Job submission) and Condor DAGMAN for splitting/merging and error recovery
  - GANGA Release management and software process
    - CVS, Savannah,…
  - Contributions to DIRAC
  - Metadata catalogue tests
    - Performance tests
    - Collaborators in Taiwan (ARDA + local DB know-how on Oracle)
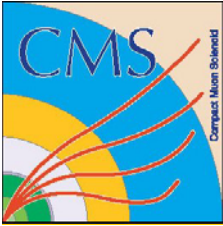
CMS

- The CMS system within ARDA is still under discussion
  - Milestone 1.6.4 late by 3 months

- Key issue (Data management)
  - Provide easy access (and possibly sharing) of data for the CMS users

- Exploratory/preparatory activity
  - Successful ORCA job submission to gLite ☺. Now investigating with the package manager
  - Access to files directly from CASTOR
  - gLite file catalog

CMS Data Management RefDB

- RefDB is the bookkeeping engine to plan and steer the production across different phases
  - simulation, reconstruction
  - to some degree into the analysis phase).
  - This service is under test
- It contained all information except
  - file physical location (RLS)
  - info related to the transfer management system (TMDB)
- The actual mechanism to provide these data to analysis users is under discussion
- Measuring performances underway (similar philosophy as for the LHCb Metadata catalog measurements)
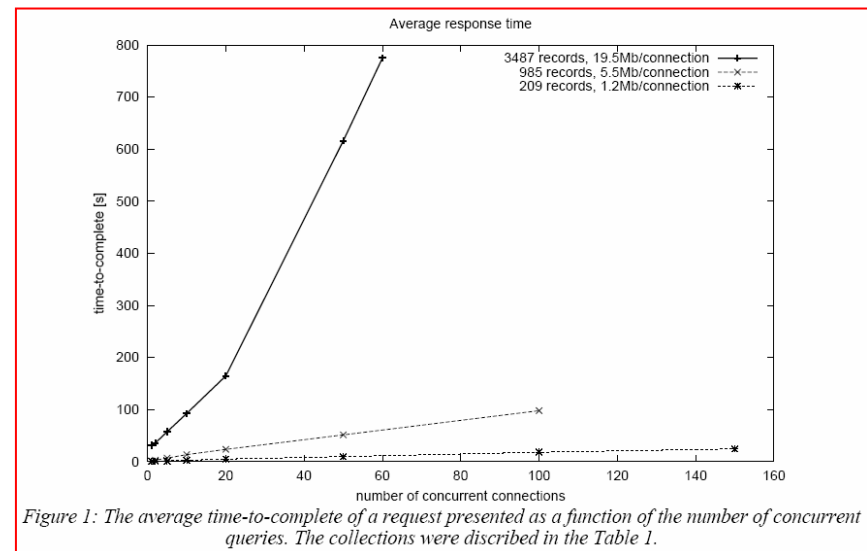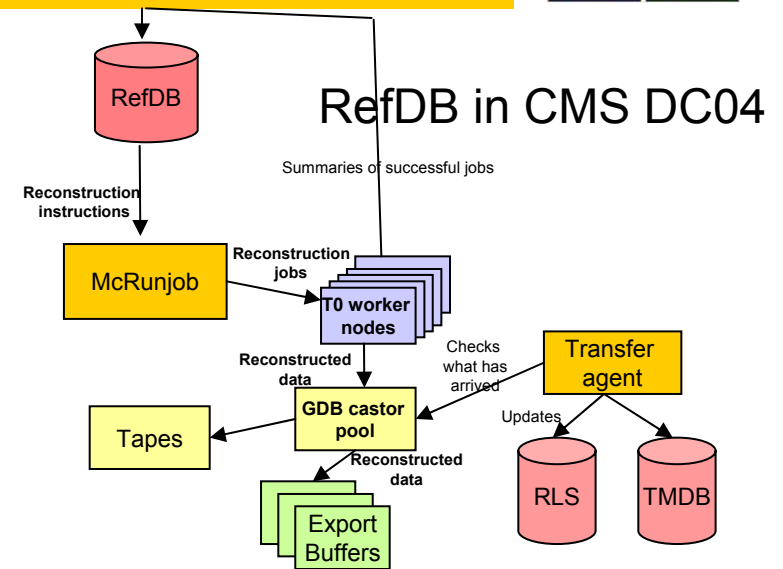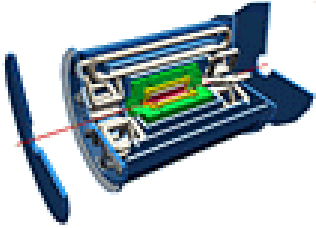
RefDB in CMS DC04

Figure 1: The average time-to-complete of a request presented as a function of the number of concurrent queries. The collections were discribed in the Table 1.
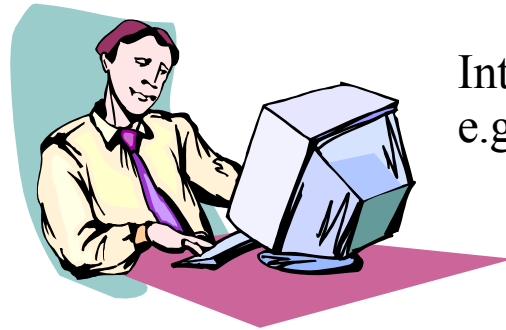
ATLAS

- The ATLAS system within ARDA has been agreed
  - ATLAS has a complex strategy for distributed analysis, addressing different area with specific projects (www.usatlas.bnl.gov/ADA)
  - Starting point is: DIAL analysis model (high level web services)

- DIAL on gLite OK (Evolution of the DIAL demo)

- ATHENA to gLite OK

- First skeleton of high level services
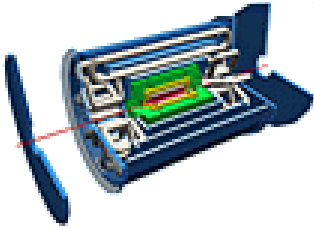
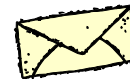# DIAL - Distributed Interactive Analysis of Large datasets

Interactive analysis
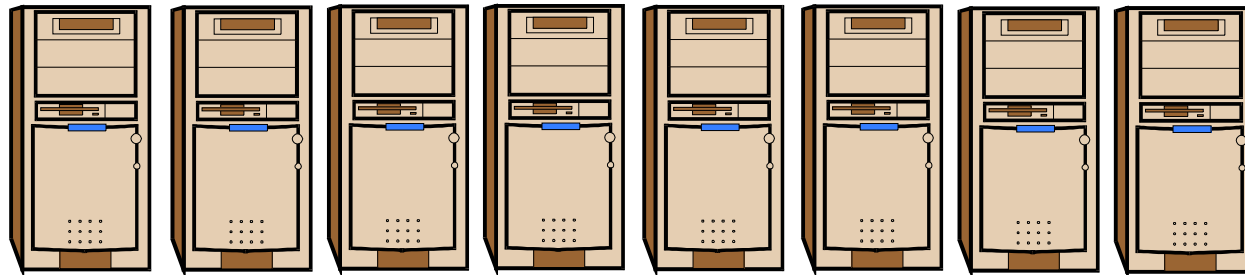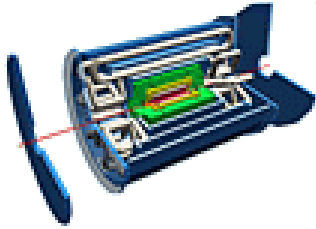e.g. ROOT, JAS, ...

DIAL

Dataset   Job   Scheduler   AAA

Distributed processing running data-specific application

ATLAS AMI Tests

- ## The **AMI metadata catalog** is a key component
  - Robustness and performance tests from ARDA
  - Very good relationship with the ATLAS Grenoble group
  - Discussions on technology (EGEE JRA1 in the loop)

Clients	Rows in Response					
	5	10	20	50	100	150
1	0.22	0.27	0.35	0.87	2.49	5.26
5	0.40	0.48	0.74	2.94	10.99	27.98
10	0.67	0.75	1.74	4.77	21.99	56.17
20	1.02	1.34	2.46	9.51	41.79	timeout
30	1.42	2.36	3.10	14.21	66.61	timeout
40	1.80	2.33	4.84	19.94	timeout	timeout
50	2.32	6.43	5.02	21.43	timeout	timeout
100	9.94	9.82	SOAP-Err	SOAP-Err		
150	16.51	SOAP-Err				

- ## In the start up phase, ARDA provided help in developing ATLAS tools (ATCOM and CTB)

Site A

PROOF SLAVES

Site B

PROOF SLAVES

PROOF

PROOF MASTER SERVER

Site C

PROOF SLAVES

ROOT

USER SESSION
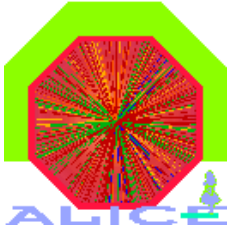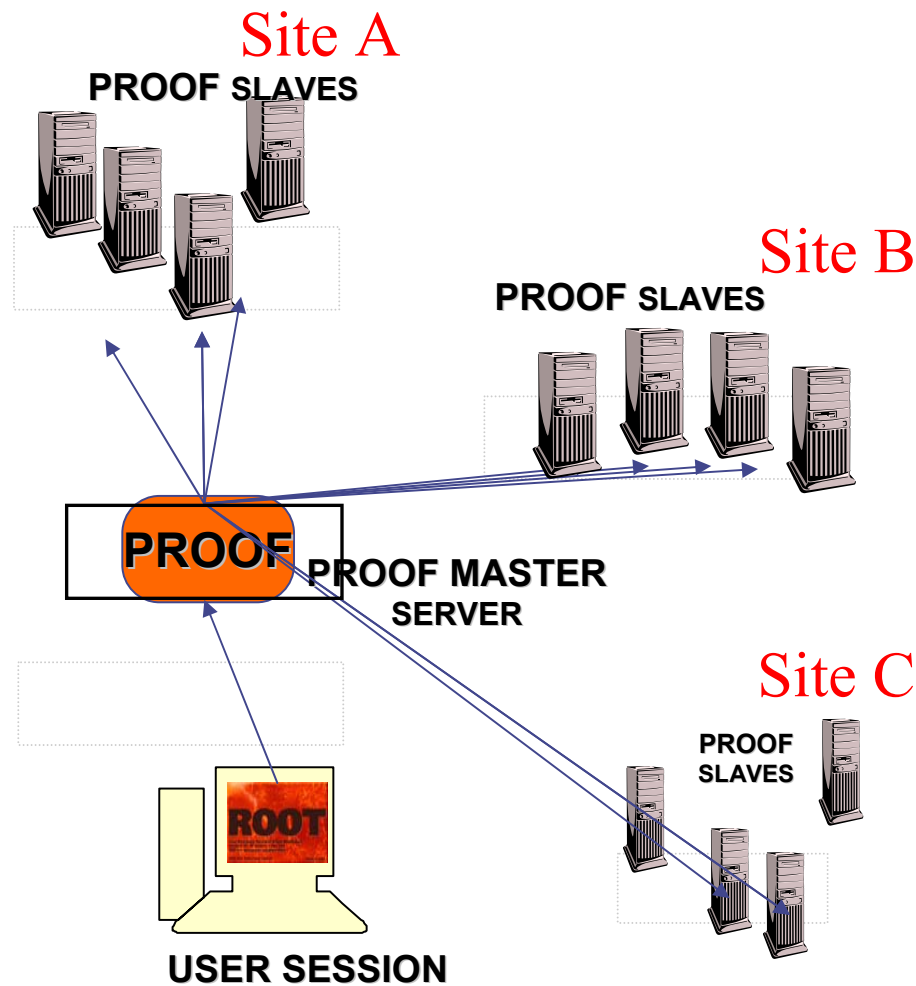
- PROOF Analysis system
- Based on ROOT

- The ALICE/ARDA will evolve the ALICE analysis system (SuperComputing 2003)

PROOF SLAVE SERVERS

Site A

Proofd
Rootd
Forward Proxy
Forward Proxy

New Elements

PROOF SLAVE SERVERS

Site B

Optional Site Gateway

Only outgoing connectivity

Site <X>

Proofd Startup

Slave ports mirrored on Master host

Grid Service Interfaces

Slave Registration/ Booking- DB

Master Setup

TGrid UI/Queue UI

Grid Access Control Service

PROOF Steer

PROOF Master

Grid/Root Authentication

"Standard" Proof Session

Grid File/Metadata Catalogue

Master

Booking Request with logical file names

PROOF Client

Status report an as a demo during the workshop by A. Peters

Client retrieves list of logical file (LFN + MSN)

ROOT Client

Grid-Middleware independend PROOF Setup
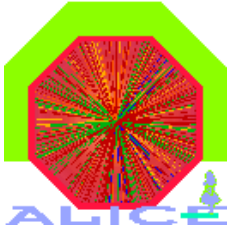
ALICE

- Where to improve:
  - Strong requests on networking (inbound connectivity)
  - Heavily connected with the middleware services
  - "Inflexible" configuration
  - No chance to use PROOF on federated grids like LCG in AliEn
  - User libraries distribution

- Activity on PROOF
  - Robustness and Error recovery

- Grid activity:
  - C++ access library on gLite ☺
  - IO library contributions

ARDA workshops

- *1st ARDA workshop (January 2004 at CERN; open)*

- **2nd ARDA workshop (June 21-23 at CERN; by invitation)**
  - **"The first 30 days of EGEE middleware"**
  - **Main focus on LHC experiments and EGEE JRA1 (Glite)**

- NA4 meeting mid July
  - NA4/JRA1 and NA4/SA1 sessions organised by M. Lamanna and F. Harris
  - EGEE/LCG operations new ingredient!

- **3rd ARDA workshop (October 2004; open)**
  - "The LCG ARDA prototypes"

- EGEE Conference meeting mid November
  - NA4/JRA1 and NA4/SA1 sessions organised by M. Lamanna and F. Harris

"The first 30 days of the EGEE middleware" ARDA workshop

- New situation:
  - gLite middleware becoming available
  - LCG ARDA project started
  - Experience + need of technical discussions
- New format:
  - "Small" (30 participants vs 150 in January), by invitation only…
  - ARDA team + experiments interfaces
  - EGEE Glite team (selected persons)
  - Experiments technical key persons
  - Technology experts
  - NA4/EGEE links (4 persons)
  - EGEE PTF chair
- Info on the web:
  - URL:http://lcg.web.cern.ch/LCG/peb/arda/LCG_ARDA_Workshops.htm

Workshop executive summary

- By invitation
  - ☺ positive technical discussions ☹ not everybody could be invited

- Emphasis on experiments
  - ☺ demonstrate their status and their plans

- MW architecture document available
  - ☹ missing a detailed description of gLite

- Important messages from ARDA
  - Resources: CPUs and sites
  - Procedure: Registration as an example
  - Stability: Service crashes

- Next workshop will be open
  - October 20-21

Important messages from the workshop

- Prototype approach OK (iterate!)
    - Priority on new functionality
    - Prepare larger infrastructure
    - Expose the API of all services

- GAS useful - Grid Access based on Web Services
    - Direct access to components is also important

- DB access via Web Services - unclear

- File Catalogue - Read-only files

- Metadata catalogues - Many projects already active, convergence unclear

- Data Management tools - can TMdb be implemented with gLite?

- Package management - interesting but unclear priority

Conclusions

- ARDA is up and running
  - Since April 1st preparing the ground for the experiments prototypes
  - Definition of the detailed work program
  - Contributions in the experiment-specific domain
  - Prototype activity started

- Next important steps
  - **(More) real users**
  - **Need of more hardware resources**
  - **Both important for December 2004 milestone**

- Stay tuned (and attend the workshop in October ☺)