



Interconnection & Interoperability of Grids between Europe & China -

Astroparticle data transfer between China and EU

Paola Celio



Dipartimento di Fisica Roma TRE - INFN Roma TRE EGEE 06 Conference, Geneva 28.09.2006



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Outline

- The Argo experiment
 - physics motivation, layout
- Argo and EuChinaGRID activities
 - Description of the modules
 - Argo specific features
- Data transfer
- Data processing
 - MonteCarlo
 - Reconstruction
- Issues
- Conclusions





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The ARGO experiment

- Italy China collaboration
- Cosmic Ray Telescope installed at 4300 m a.s.l. at YangBaJing (YBJ, Tibet)



- Physics goal: study cosmic air showers, especially at low energies (< 1 TeV)
 - gamma ray astronomy
 - gamma ray burst physics
 - sun physics
 - primary proton spectum, ...



ARGO - YBJ / Event: 8166





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ARGO and EuChinaGRID

- Activity of ARGO group in EuChinaGRID is focused on data management:
 - Data Transfer:
 - efficient transport of data to both main sites (IHEP and CNAF)
 - Data Processing
 - MonteCarlo simulation
 - Data Reconstruction
 - > users' analysis left for the future
- Argo specific features:
 - only two sites (IHEP and CNAF), ...
 - ...but both are "primary"
 - want the full data set, both raw and reconstructed data





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- Experimental data collected at YBJ with full detector: 7.5 MB/s
 - steady data flow, high uptime: ~20 TB/month, ~200 TB/year
- Data taking organized in runs, a period of data taking during which conditions are kept constant
 - each run made of several data files (< 2 GB each) and one or two small auxiliary text files
- Informations about runs and files are stored in a relational database (postgres).
- Constrained by network connectivity at YBJ, which used to be limited at 8 Mb/s: use tapes as main method for transfer.
 - Some network transfer to IHEP, barely sufficient even at present rate







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- Now we'll have network link from YBJ to rest of the world upgraded to 155 Mb/s and network connectivity between China and Europe upgraded to two 2.5 Gb/s links
- This framework paves the way to the use of GRID technologies
 - Main Objectives
 - optimize resource usage, make data available sooner
 - stimulate formation of more integrated working groups
 - > make sure everybody uses same software (calibrations, etc.)
 - Requisites
 - minimize complexity at YBJ.







- Rather simple configuration, three sites involved but have different roles:
 - production site: YangBaJing
 - Tier1 sites: CNAF and IHEP
- Will present in next slides a Grid-enabled implementation to cope with Argo "problem":
 - based on GILDA testbed (Glite3)
 - Developing the application we have to remember that we need working system soon
 - took what was more easily pluggable (available and working and what we managed to configure)
 - expand/extend later if need be





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YBJ:

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- YBJ is master site
- CNAF and IHEP are "replicas", updated asynchronously with respect to data transfer
- respect to data transfer
- no CNAF-IHEP updates

- Relational database for DAQ:
 - store information about files and runs
 - updated to reflect current transfer status of files
 - synchronizations done using database tools or custom scripts
- Not yet "gridified". Studying possibility to substitute (in total or in part) with AMGA or RGMA





Data transfer in detail

YBJ procedures:

- promote DAQ files to GRID files:
 - update local DB: associate logical name to each file
- cleanup DAQ disk to make sure DAQ can write data:
 - delete files when found in both LFC catalogues
 - if need disk space for any reason (LFC failure, unable to transfer,...) activate tape backup
 - update local DB: flag file as "to-tape" or "deleted", or reset "in transfer" flag if transfer is taking too long
- enqueue for transfer:
 - select entries on local SRM yet to be transferred
 - select available FTS server and channel (try IHEP first)
 - queue to FTS
 - update local DB: save guid and service used





Data transfer in detail

- IHEP (or CNAF) procedure (could be split):
 - Purposes: register files transferred from YBJ or from other side, make sure each LFC contains both the local and the remote copies
 - select all non-local files (local DB? FTS? ...);
 - check local DPM;
 - > if file found: check local LFC, register if not present, next
 - > if file not found: check other side;
 - if present at other side: queue to FTS, next
 - if not present at other side: next (and hope YBJ re-queues it)
 - if file is in local LFC, check other side
 - > if found at other site: register as replica, next
 - > if not found: next (try again later)







Data transfer in detail

- Above data transfer strategy implemented and working:
 - Now need extensive tests
 - Had some last-minute problems related to FTS channel setup
- Aim at having it in production soon!







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Data processing: MonteCarlo

- MonteCarlo simulation (easier things first...)
 - Corsika (and Fluka): physics simulation
 - Capitalize on experience by MAGIC, which already uses Corsika on the GRID
 - RPMs created, under test: will start by installing them at Roma3 and CNAF
 - Next step is porting of procedures for JDL creation, may be also porting of Magic's web interface
 - ArgoG (based on GEANT3): detector simulation
 - widely used by "anybody else", so...
- Not expecting great difficulties







Data processing: Reconstruction

- Data reconstruction
 - objectives:
 - process all raw data as soon as possible
 - make all processed data available to both sites
 - benefits:
 - optimize CPU usage
 - transparent access to resources
 - minimize human time spent on production activities (1 person for 2 sites)







Data processing: Reconstruction

- Key role for relational DB
 - might be susbstituted with AMGA, RGMA
 - DB synchronization and update more critical:
 - want to avoid both sites submitting same jobs (in a stronger way than just by policy agreement)
 - synchronization tool depends on database structure
- Planning for just one database that other sites will replicate
 - replica: critical parts read-only, non-critical parts can be updated







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Argo and GRID: issues

- VO exists but:
 - mutual acceptance of CA,...
 - implementation details: how many BDIIs? RB? ...
 - technical details: how to run cksum on a file? which tools exist for catalogue synchronization? ...
- strategy for the definition of a "production group"
 - ownership of files in the Grid
 - ownership of FTS channels (also for querying)
- Need to agree upon:
 - logic names conventions
 - database structure
 - software versions and configurations





The first development has finished and now we need to make an intensive test Of the application to discover and to resolve some "features" to optimize the application.

We are building a java interface to show the data transfer and to monitor in a very user friendly way the processes.

Next steps well be the development of the same procedure using the API to interact in a deeply way with the grid environment and to build a monitor with a more general purpose.

Furthermore we are investigating performances of database used and an optimization of the bandwidth.







References

- [1] Fulvio Galeazzi Application of GRID technologies to the ARGO experiment: data transfer and data reconstruction – EuChinaGRID Meeting June 2006
- [2] Cristian Stanescu EuChinaGrid Meeting Rome September 2006







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Thank you for your kind attention !



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