WP4 Fabric Management

3rd EU Review

Maite Barroso - CERN
Maite.Barroso.Lopez@cern.ch

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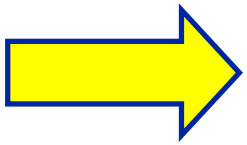
Outline

- Objectives from the technical annex
- Achievements: summary of WP4 products
- Lessons learned
- Future
- Exploitation
- Questions

WP4: main objective

"To deliver a computing fabric comprised of all the necessary tools to manage a center providing grid services on clusters of thousands of nodes."



- **User job management (Grid and local)**
- **Automated management of large clusters**

WP4 Architecture concepts

- **Modularity.** Open interfaces and protocols
- **Scalability.** Thousands of machines
- **Automation.** Minimize manual interventions
- **Node autonomy**. Operations are handled locally whenever possible
- **Site autonomy**. A site must keep control of its local resources

Fabric Management

Grid Users

FABRIC

Fabric Gridification

Local Users

Resource Management

Installation Configuration Management

Fabric Monitoring

Fabric Fault Tolerance

Fabric Management

User job management

Grid Users

LCAS
LCMAPS

-Secure job submission and job control

- Local authorization and mapping of grid credentials

FABRIC

Local Users

RMS

Ensure the efficient scheduling and execution of user (grid or local) jobs and their coordination with maintenance tasks

Installation Configuration Management

Fabric Monitoring

Fabric Fault Tolerance

Fabric Management

Grid Users

-Fabric wide CDB provides central storage and management of all fabric configuration information

-Subsystems running on the nodes take care of managing software packages and configuring local services

-Framework for automatic fault detection and correction

- Correlation Engines regularly check the monitoring data

-If data is not between defined limits, they trigger alarms or recovery actions

Fabric Gridification

FABRIC

Local Use

Resource Management

Au ated m gement
f large ters

quattor

Lemon

Fault Tolerance Framework

Fabric Management

Grid Users

LCAS
LCMAPS

FABRIC

Local Users

RMS

quattor

Lemon

Fault
Tolerance
Framework

Lessons learned

- Fabric Management components are not grid components themselves but they are essential for a working grid.

- Fabric management components need to be deployed, stabilized and understood by system administrators before the rest of the middleware components

- Experience and feedback with existing tools helped to get requirements and early feedback from users and site administrators

But interim solutions tend to live longer than expected!

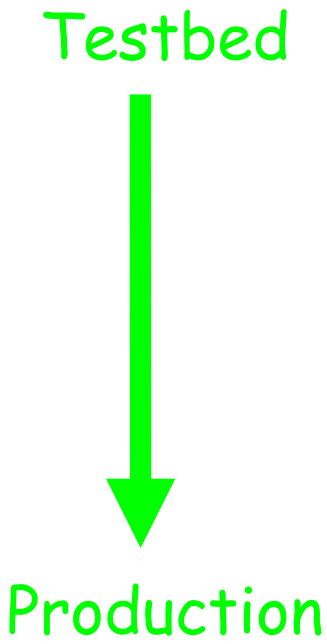
Lessons learned

- There is a real need to be able to install, configure and manage the small-medium-big sites (complexity is the same!)

- Sites find it very difficult to change fabric management framework:
  - It implies learning a new framework: new procedures, new tools
  - It has to coexist with legacy tools, services and procedures, hence it has to be modular and with very clean interfaces so they can be incrementally replaced
  - The EDG sites were testbeds, where tools and procedures could be imposed. This is not the case for production sites

Future

Move from testbeds to production fabrics



- Functionality
  - Performance and scalability
- Simplification, Automation
  - Focus on providing a service
  - Process and procedure
  - Availability and reliability
  - Stability and robustness

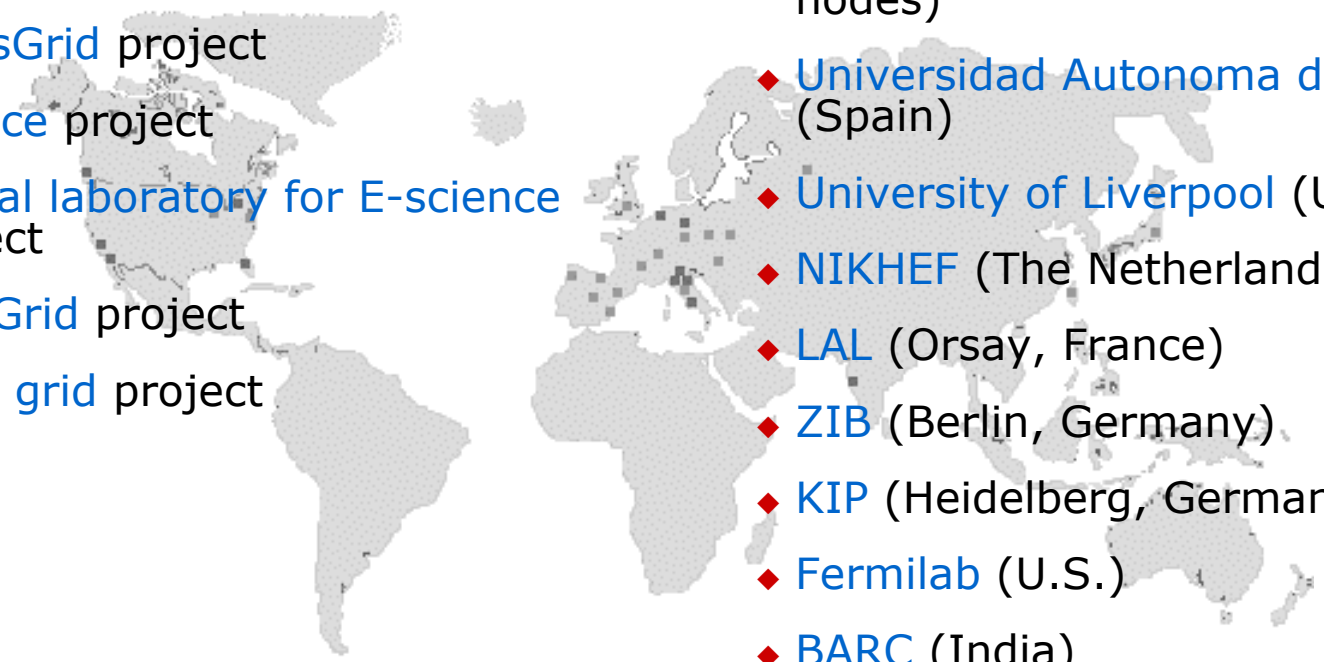
Future

- **Gridification**: evolution in the directions marked by GGF for authorization and authentication
  - The support and extension will be undertaken by EGEE
- **RMS**: Evolution for data aware scheduling in clusters
- **EDG-LCFGng**: No support after the end of the project. Replaced by quattor, the final solution for installation and configuration mgt
- **Quattor**:
  - Security enhancements (e.g. fine-grained authorization access to CDB, data encryption)
  - Porting to Solaris and to future RH versions or other Linux distributions
- **Lemon**:
  - Displays/GUIs
  - Port to other platforms (Solaris, Windows)
- **Fault Tolerance**:
  - User FT API
  - Port to other platforms

Exploitation

WP4 products have been deployed within the EDG testbed and within other production sites and Grid projects/environments:

- LHC Computing Grid project (LCG)
- CrossGrid project
- GridIce project
- Virtual laboratory for E-science project
- FlowGrid project
- INFN grid project



- CERN Computing Centre (~2000 nodes)
- Universidad Autonoma de Madrid (Spain)
- University of Liverpool (UK)
- NIKHEF (The Netherlands)
- LAL (Orsay, France)
- ZIB (Berlin, Germany)
- KIP (Heidelberg, Germany)
- Fermilab (U.S.)
- BARC (India)

Exploitation

WP4 products have been deployed within the EDG testbed and within other production sites and Grid projects/environments:

- LHC Computing Grid project (LCG)
- CERN Computing Centre (~2000 nodes)

These deployments will ensure the maintenance and evolution of the WP4 framework after the end of the DataGrid project

- INFN grid project
- ZIB (Berlin, Germany)
- KIP (Heidelberg, Germany)
- Fermilab (U.S.)
- BARC, India

Summary

- WP4 has delivered a complete and evolvable fabric management framework
- Initial deployments at production sites show that the framework is accepted
- The growing user community will ensure the continued existence of the WP4 fabric management framework after the end of the DataGrid project