DataGRID WP4 - Fabric Management

Status report @ HEPiX 2002, Catania / IT, 18.04.02, Jan Iven

Role and Architecture

Status reports

Installation

Monitoring

Others

Short-term planning

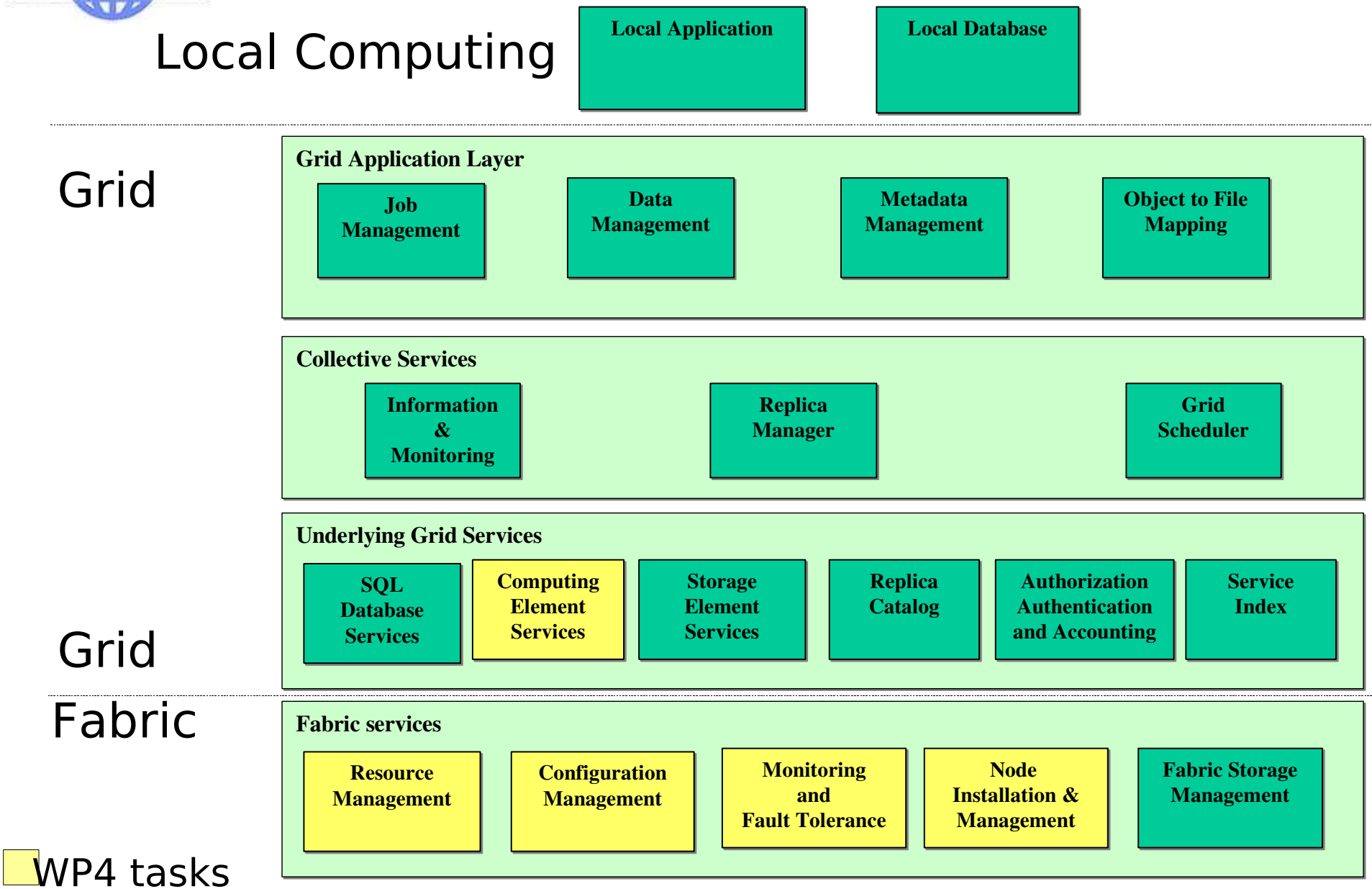
WP4 - Background information

- WP4's objective: *deliver the necessary tools to manage a computing fabric providing grid services on clusters scaling up to thousands of nodes.*
- Main scope:
  - Fabric (system administration) management
  - User job management (Grid and local)
- Official participants: CERN (leading partner), INFN, NIKHEF, University of Heidelberg, ZIB (Berlin) and University of Edinburgh/ PPARC

Functionality

- Enterprise system administration - scalable to O(10K) nodes
  - Automated installation and maintenance of nodes
  - Resource management (batch, interactive)
  - Monitoring of events and performance
  - Fault tolerance & recovery actions
  - Fabric Configuration Management
- Provision for running Grid jobs
  - Authorization according to local policies
  - Mapping Grid credential to local ones
  - Publication of fabric resources and job information
- Provision for running local jobs
  - Sharing of resources according to local policies

DataGRID Architecture



WP4 tasks

WP4 Architecture overview

- Interface between Grid-wide services and local fabric;
- Provides local authentication, authorization and mapping of grid credentials.

Resource Broker (WP1)

Grid Info Services (WP3)

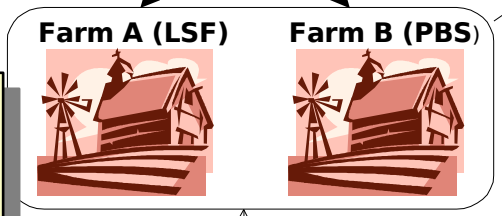
- provides the tools for gathering monitoring information on fabric nodes;
-central measurement repository stores all monitoring information;
-- fault tolerance correlation engines detect failures and trigger recovery actions.

Fabric Gridification

- provides transparent access to different cluster batch systems;
- enhanced capabilities (extended scheduling policies, advanced reservation, local accounting).

Resource Management

Monitoring & Fault Tolerance



- provides the tools to install and manage all software running on the fabric nodes;
-Agent to install, upgrade, remove and configure software packages on the nodes.
-bootstrap services and software repositories;

Installation & Node Mgmt

Configuration Management

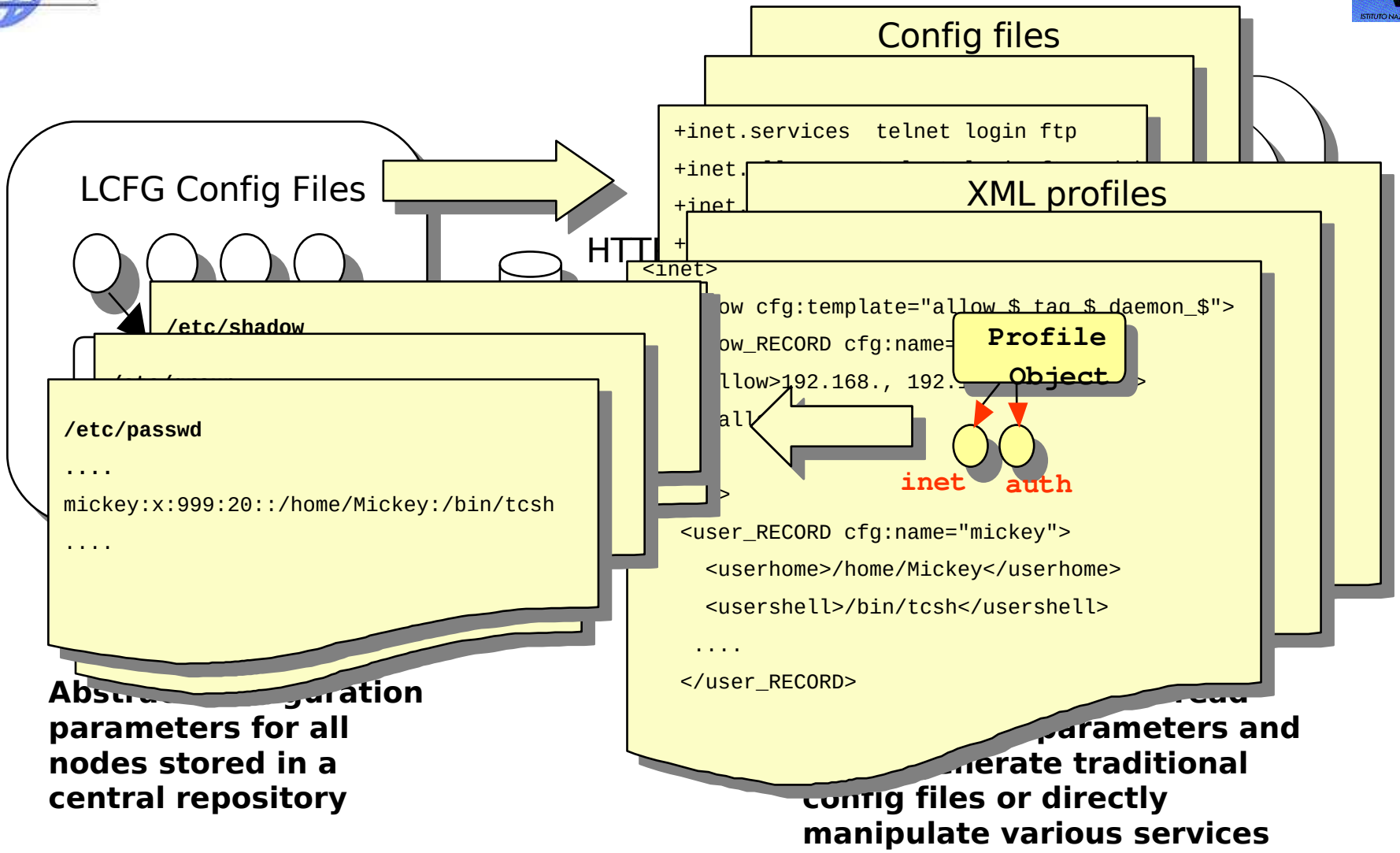
- provides a central storage and management of all fabric configuration information;
- central DB and set of protocols and APIs to store and retrieve information.

Status: Installation

- Main focus: Linux on i386
- Prototype available, based on a tool originally developed by Edinburgh University: LCFG (Local ConFiGuration system).
- Main Features:
  - automatic installation of O.S.
  - installation/upgrade/removal of software packages
  - configure and manage standard services and custom packages
  - Uses a central, hierarchical configuration database
- Deployed on EDG testbed 1 in September 2001, interim releases every ~2 months. Currently ~70 nodes (CERN, INFN, NIKHEF, RAL + other UK, IFAE-Barcelona, LIP-Lisbon), +~30 being installed now (ESA-ESRIN, NIKJEF)

LCFG overview

Slide prepared by INFN



Monitoring + Fault Tolerance

- Principle:
  - A Monitoring Agent running on each node samples the configured metrics via sensors
  - The samples are sent to a central Monitoring Repository and stored. The samples are also stored locally to allow for local fault tolerance if appropriate
  - Correlation engines act on local or central data
    - Trigger actions, e.g. Alarms or Recovery
    - Create higher-level data
  - User Interface allows to query Repository, displays alarms
- Status:
  - Component APIs have been defined
  - First version of Agent available, deployed on EDG (~15) and CERN (~1000) nodes
  - Current prototype uses simple DB based on flat files

Other Statuses (Stati?)

- Fault Tolerance
  - Prototype which periodically checks the CPU/chip set temperatures as well as the fan speeds.
- Configuration Management
  - High Level Configuration Description Language: declarative way of describing configuration of computer systems. First draft available.
  - High Level configuration Language to Low Level Configuration language Compiler. Alpha prototype available.
  - Central Configuration Database (CDB) (central store for all fabric configuration information). Being designed.
- Resource Management
  - Working on first prototype of the Resource Management Subsystem
- Gridification
  - Enhancing the Globus gatekeeper with plug-in authorization and credential mapping components.

Planning up to Release 2 (09/02)

- Installation: Split "Production" and "Research"
  - Deliver Production quality LCFG in R2
  - Move to latest LCFG: support PXE installations, RedHat7.2
  - New Configuration Schema
  - Deploy new configuration language compiler
- Monitoring: complete Prototype in R2
  - Prototype-quality agent , deploy everywhere
  - Simple alarm display / GUI
  - Rework transport layer (UDP → reliable transport)
  - Integrate SNMP
  - Select and move to "real" database

Summary and Links

- WP4 is well-established: software deployed and used
- Release 2 will be **Evolution**, not **Revolution**
- @CERN: close collaboration between WP4, farm admins and LCG team

- DataGRID project: http://cern.ch/eu-datagrid
- DataGRID WP4 : http://cern.ch/hep-proj-grid-fabric
- LCFG: http://www.lcfg.org