Chapter XX
Developing Biomedical Applications in the Framework of EELA

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ABSTRACT

In the last years an increasing demand for Grid Infrastructures has resulted in several international collaborations. This is the case of the EELA Project, which has brought together collaborating groups of Latin America and Europe. One year ago we presented this e-infrastructure used, among others, by the biomedical groups for the studies of oncological analysis, neglected diseases, sequence alignments and computational phylogenetics. After this period, the achieved advances and the scientific results are summarized in this chapter.
INTRODUCTION

EELA (E-Infrastructure shared between Europe and Latin America, see http://www.eu-eela.org) is a Project funded by the European Commission that began in January 2006. Its objective is building a digital bridge between the existing e-Infrastructure initiatives in Europe and those that were emerging in Latin America, through the creation of a collaborative network that shares an interoperable Grid infrastructure to support the development and test of advanced applications.

One of the areas of work is the identification and support of Grid enhanced applications. This scientific research covers several fields, but due to the high social impact in the Latin American society, one of the pillars of the Project is Biomedicine and, consequently, the applications that can be run on the Grid.

Some of them, falling in three typical categories of bioinformatics applications, computational biochemical processes and biomedical models, were selected and started to be deployed on the infrastructure for both production and dissemination purposes.

This document describes these biomedical applications running in the Project and the advances and scientific results that have been achieved, among others, in the field of cancer diseases, the drug discovery in Malaria, the determination of sequences in parasite diseases and in the HIV origin.

BACKGROUND

The realization of a common interoperable Grid testbed from existing resources in Latin America and Europe, distributed over 15 resource centers, was the first problem to overcome. For this purpose, the testbed was built upon the network infrastructure provided by GÉANT in Europe and RedCLARA in Latin America and interfacing with European and Latin American National Research and Education Networks (NREN).

The Pilot Testbed is organized in three layers: at the highest level, the EELA Operations Centre (old Grid Operations Centre) coordinates the interaction between the subordinate CORE Services Centers (CSC) and the Resource Centers (RCs) which provide computing power and data storage. At the base level we have the Additional Service Providers (ASPs) which provide support for services needed by proper operation of the Pilot Testbed but not directly related to the middleware utilized, such as Certification Authority management and Virtual Organization Management Services (VOMS) and File Catalogues.

EELA has integrated more than 1,500 computing cores and 60 TB of data storage available to the project users and has been accepted as member of The Americas Grid Policy Management Authority (TAGPMA), as well as new national Latin American Certification Authorities have been accredited too. EELA has two distinct VOs (EELA and EDTEAM) and accepts two particular High Energy Physics VOs (Alice and LHCb), accounting for 4 VO setups. EELA provides network services through standard modeling processes thus ensuring the required quality of service.

As EELA has adopted the gLite Middleware (see http://glite.web.cern.ch/glite/), EELA has tight interactions with EGEE (see http://www.eu-egee.org/) and with the Joint Research Program GEANT2. The compatibility between different middleware is another concern of the Project and is one of the future research lines of EELA, to be carried out in collaboration with the peer-to-peer OurGrid Project (see http://www.ourgrid.org/). In addition, several Globus components, such as the GridWay Metascheduler (Huedo et al., 2005) have been adopted in order to run the applications and their inner dependencies in a successful way.

Various disciplines in the realm of biomedicine have experienced drastic progresses on development of models, tools and procedures which make use of the extensive computer cycles and data storages. The White Paper on HealthGrid (see, http://whitepaper.healthgrid.org) identifies five