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Applications integrated on the GILDA's testbed.

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Created with the goal of providing an infrastructure for training and dissemination, GILDA revealed itself also as a cute entry point for those communities, often without any experience of distributed computing, desired to test whether or not their applications would receive an added value from the grid. The wide range of applications supported, shows also as a single testbed can serve applications and communities with disparate purposes and final goals. The intensive use of the GENIUS web portal eased the approach to grid for native users, hiding the complexity of middleware, providing also an immediate interface when graphical input/output is required. Hereafter a list of the most significant applications supported in these two years is reported. A list of the most relevant applications that have been integrated on the GILDA's testbed is reported. During the on-line demo session will be presented one or two of these applications focusing on the main EGEE services used.

GA4tS
The acronym GA4tS stands for "Genetic Algorithm for thresholds Searching". It represents a medical application on a grid infrastructure connection, designed in the framework of the INFN MAGIC-5 project, which aims at developing interactive tools to help radiologists with mass detection in mammography image analysis. Given a database of mammography images and extracted from each image a certain number of suspicious regions or regions of interest (ROI), GA4tS is a genetic algorithm able to discriminate among two possible ROI populations (the positive ROI population and the negative ROI population), performing a ROI-based classification. A positive ROI is a pathological ROI, containing a neoplastic lesion or a cluster of micro calcifications. Instead, a negative ROI has no kind of pathology and means healthy tissue. The huge amount of computing power exploitable by the genetic algorithm during its computation represents the grid added value. GA4tS interacts with the LFC's catalog in order to transfer on the worker node the MATLAB Math and Graphics Run-Time Library needed by the genetic algorithm.

Computational Chemistry
The GEMS (gGrid Enabled Molecular Simulator) prototype has been initially implemented on the GILDA test bed infrastructure for the specific case of the study of the properties of gas phase atom-diatom reactions. Recently the prototype has been ported on the production grid. The specific theoretical approach adopted requires massive integrations of trajectories and parallel runs on the largest number of nodes available. Here the advantages of the grid are in the large availability of nodes where the parallel software can run on.

gMOD
gMOD (grid Movie on Demand) is a new application developed to show up how the Grid can give its contribution to make businesses in the world of Entertainment. Plugged into GENIUS, the goal of gMOD is providing a Video-On-Demand service. They are presented a list of movies (movie trailers in our case due to license issues) to choose from and once they have made a choice, the video file is streamed in real time to the video client in the user's workstation. gMOD is built on top of the new EGEE gLite middleware and makes use of many gLite services (FiReMan and AMGA Catalog, WMS

and VOMS). It is worth nothing that gMOD has been realized having in mind the commercial issues and technical problems of a Video On Demand service but can also be used to retrieve any kind of digital multimedia contents from the network with many possible interesting applications such as, for example, e-Learning Systems and Digital Libraries. The grid added value in this case is represented from the large capability of storage, and the absolute safety provided from the use of digital certificates, which gives the faculty to the provider of revoking them in any moment, and setting a predefined and unchangeable time for the provided services.

hadronTherapy
hadronTherapy is a simulation program based on the CERN toolkit GEANT4, developed at INFN LNS. hadronTherapy simulates the beam line and particles revelators used in the proton-therapy facility for the cure of eye cancer at CATANA (Centro AdroTerapia e Applicazioni Nucleari avanzate), active even at INFN-LNS. The typical advantages of porting a Montecarlo code on the grid, the linear factor gained with the simulation splitting, are improved with the recombination of outputs produced by the sub jobs and analyzed. A graphical output is finally obtained exploiting the ROOT's features.

Patsearch
PATSEARCH is a flexible and fast pattern matcher able to search specific combinations of oligonucletide consensi and secondary structure elements. It is able to find, in a given sequence(s), kinds of loop structures that characterize tRNAs, rRNAs and/or any kind of pattern in DNA and protein sequences. Thanks to the grid, PatSearch's application is able to split the search of the given sequence(s) submitting up to ten independent jobs and collects, at the end, the partial results and produce a final output. PatSearch interacts with the LFC's catalog in order to transfer on the worker node's working directory the input file needed by the pattern matcher. PatSearch is one of the candidate applications of the recently approved EU BioInfoGrid Project.

NEMO and ANTARES
The NEMO collaboration has undertaken a R&D program for the construction of an underwater km3 wide telescope for high energy neutrino astronomy in the Mediterranean sea, while ANTARES is constructing a smaller (0.1 km2) underwater neutrino telescope near the Toulon coast. The CORSIKA Montecarlo simulation code is used by NEMO to simulate the interaction of primary cosmic ions with the atmosphere up to the sea level with particular reference to the atmospheric muons generated. In fact, muons represent one of the main sources of background for underwater telescopes for high energy neutrino astronomy. Mass production of muons at the sea level has been simulated first on GILDA and then on the INFN Grid production grid both for the NEMO and ANTARES set-ups. The NEMO collaboration from the grid takes the advantages of the thousands of CPU, which allows to split their simulation in n sub jobs, gaining a factor of n in execution time. Also CORSIKA simulations uses large input files, which could have been handled with much more difficulty without the grid capacity of storage.

Primary author: Prof. BARBERA, Roberto (INFN - University of Catania)

Co-authors: Mr FALZONE, Alberto (NICE Srl); Dr CALANDUCCI, Antonio (INFN Sez. Catania - Italy); Mr CARRIERI, Antonio (INFN Sez. Catania - Italy); Dr GIORGIO, Emidio (INFN Sez. Catania - Italy); Mr PASSARO, Gianluca (INFN Sez. Catania - Italy); Dr ANDRONICO, Giuseppe (INFN Sez. Catania - Italy); Dr LA ROCCA, Giuseppe (INFN Sez. Catania - Italy); Mr PLATANIA, Giuseppe (INFN Sez. Catania - Italy); Dr PAPPALARDO, Marco (INFN Sez. Catania - Italy); Ms RICCERI, Rita (INFN Sez. Catania - Italy); Ms CATANIA, Rosanna (INFN Sez. Catania - Italy); Dr MONFORTE, Salvatore (INFN Sez. Catania - Italy); Dr ARDIZZONE, Valeria (INFN Sez. Catania - Italy)

Presenters: Dr CALANDUCCI, Antonio (INFN Sez. Catania - Italy); Dr LA ROCCA, Giuseppe (INFN Sez. Catania - Italy)

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