

Modeling star evolution on the GRID

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Describe the scientific/technical community and the scientific/technical activity using (planning to use) the EGEE infrastructure. A high-level description is needed (neither a detailed specialist report nor a list of references).

In Astronomy, the possibility to use a large set of stellar evolution models spanning a wide range of stellar masses and initial chemical composition, is a necessary pre-requisite for any investigation aimed at interpreting observations of Galactic and extra-Galactic stellar populations. FRANEC is a numerical code designed to address this problem. We present the activity done to use the EGEE computational Grid environment to produce a large set of evolutionary tracks to compare with observat

Report on the experience (or the proposed activity). It would be very important to mention key services which are essential for the success of your activity on the EGEE infrastructure.

FRANEC is a serial code, each instance of this code produce a stellar model for a star of a given mass. It is written in Fortran. To create evolutionary tracks it is necessary to use a computational environment that is able to manage workflows operations. The EGEE resource Broker is able to manage DAGs and parametric Jobs, and we use this capability to run swarm of FRANEC runs. A Grid File catalog is mandatory to share data between different researcher. FRANEC-G (FRANEC on GRID) will be available as a command line interface that, starting from a configuration file, automatically distributes jobs on the GRID. Moreover, we are planning to redesign the BaSTI archive to allow astronomers to access any stellar model though a portal (www.oa-teramo.inaf.it/BASTI) . If the model has been already simulated it is uploaded otherwise a Grid job is submitted. This job is a swarm of FRANEC runs. The asynchronous webservice technology is used to give the result back to the Astronomer.

With a forward look to future evolution, discuss the issues you have encountered (or that you expect) in using the EGEE infrastructure. Wherever possible, point out the experience limitations (both in terms of existing services or missing functionality)

Porting FRANEC code on EGEE did not implies deep modification in the code structure, data access is easely implemented using a specific application layer that interacts with the Grid services. However, the evolution of our work focused on integrating FRANEC-G on a Web Portal which is not Grid specific. The portal shuld have both database access and Grid "access". This invlvesse the possibility to access through web services the EGEE resources.

Describe the added value of the Grid for the scientific/technical activity you (plan to) do on the Grid. This should include the scale of the activity and of the potential user community and the relevance for other scientific or business applications

In these last years, “FRANEC” has been extensively used for computing models of Stars (for a wide range of mass and chemical composition, and in all their evolutionary stages) that have been compared with the most recent empirical data from both ground-based telescope and space ones such as the Hubble Space Telescope. It is used to produce a library of stellar evolutionary predictions: the BaSTI archive. BaSTI is the most updated database of stellar models all around the world and it is a formidable tool for population synthesis investigations. It is particularly important to complete as much as possible the archive. This effort would require a huge amount of computing power. Moreover, it is crucial to fulfill the requests of astronomers that need a model not already present in the archive with “on-the-fly” runs. Grid computing is an answer to FRANEC data generation and processing needs. Grid may be used by Astronomers share simulated data and analyze the results obtain

Primary authors: Dr TAFFONI, Giuliano (INAF - SI); Dr FRANZETTI, Paolo (IAFS-Milan); Prof. CASSISI, Santi (INAF-OATERAMO)

Co-authors: Dr PIETRINFERNI, Adriano (INAF-OATERAMO); Mr BARISANI, Andrea (INAF-OATS); Mr BARISANI, Andrea (INAF-OATS); Prof. GARILLI, Bianca (IASF-Milan); Dr VUERLI, Claudio (INAF-OATS); Dr VUERLI, Claudio (INAF-OATS); Prof. PASIAN, Fabio (INAF-OATS); Prof. PASIAN, Fabio (INAF-OATS); Dr MANNA, Valeria (INAF-OATS); Dr MANNA, Valeria (INAF-OATS)

Presenter: Prof. CASSISI, Santi (INAF-OATERAMO)

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