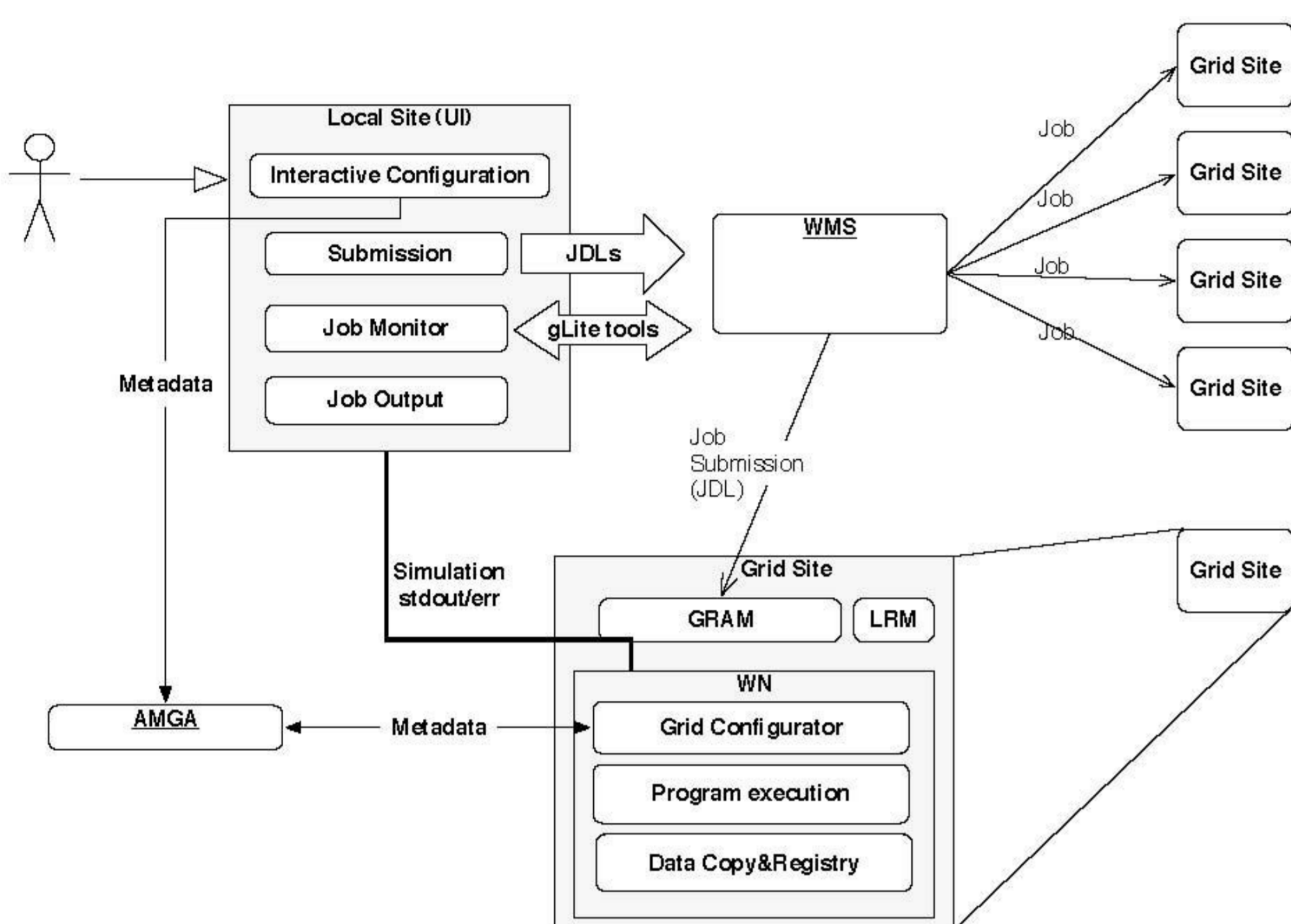


Numerical Simulations and Databases in Astronomy, and their integration in Grid: FRANEC and BaSTI as a practical example

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Some key concepts

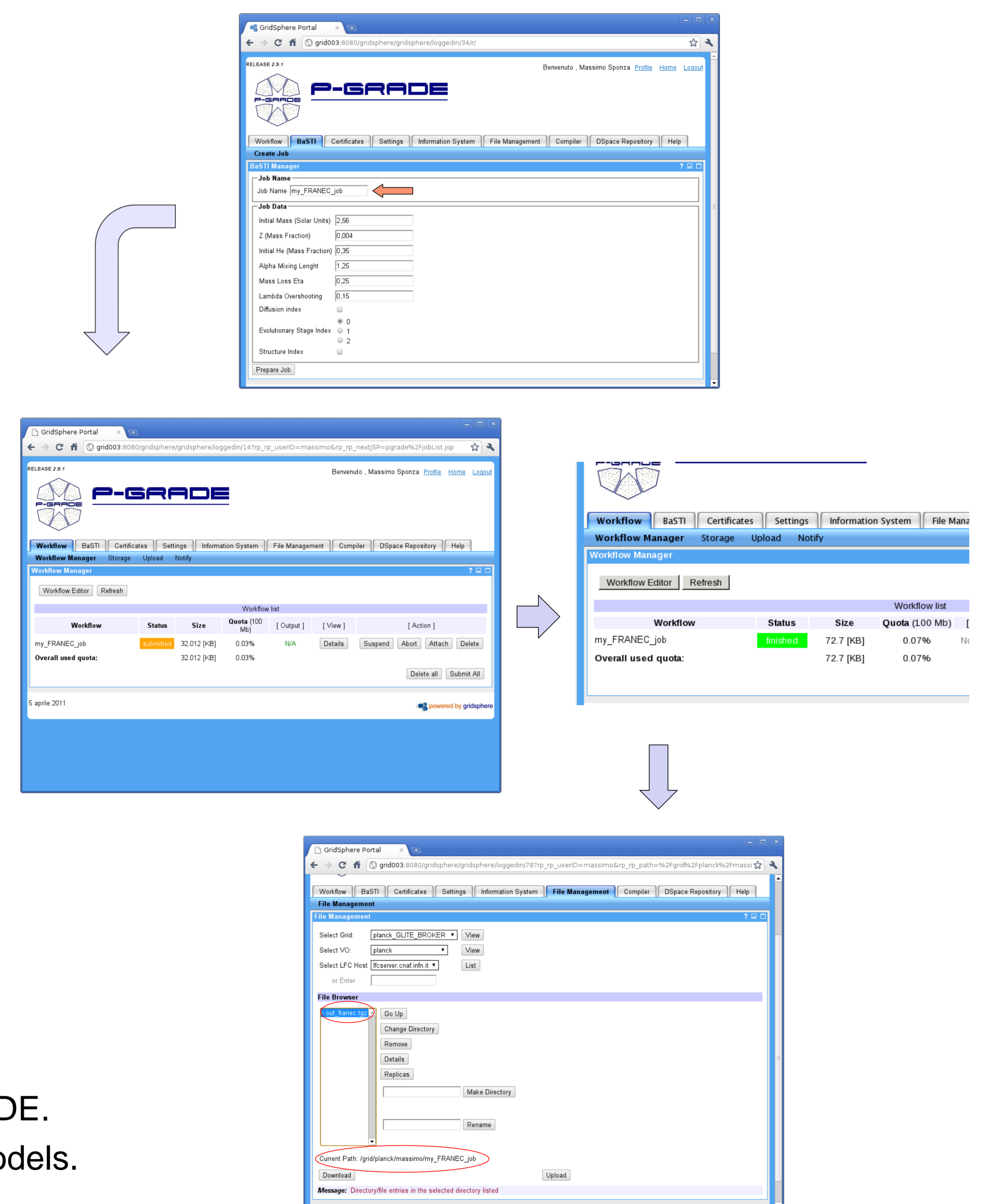
- Stellar evolutionary computations are extremely important to face a wealth of astrophysical problems; such problems are extremely demanding in terms of computing power and data storage.
- BaSTI (The Bag of Stellar Tracks and Isochrones) is a theoretical astrophysical catalogue that collects fundamental data sets involving stars formation and evolution.
- BaSTI is also a usecase for the Virtual Observatory, and a testbed for the definition of standards to access numerical simulations.
- To create and populate BaSTI, a large number of stellar evolutionary computations are necessary.
- We proved that the “gridification” of stellar evolution code is extremely convenient in terms of data processing speed and data sharing.

FRANEC, the code used to feed BaSTI and the Command Line Interface

- A single run of FRANEC produces one synthetic model (SMR), to compute a full isochrone (Full Isochrone Run, FIR) it's necessary to execute a large number of SMR.
- The application is based on gLite User Interface, a command line interface. A set of script and a Perl program has been prepared allowing users to submit both SMRs and FIRs jobs on grid.
- Some specific services was installed and it is used by the application instead of the available services.

The Graphical User Interface, P-GRADE portal

- A specialized dedicated portal has been built on top of P-GRADE. The aim was to give a GUI to the new users.
- The portal is implemented in a modular way so that its components may be reused more times. The portal become the framework to build new application.
 - Added a portlet allowing users to insert values for all those parameters necessary to run the job.
 - Automatic check of inserted data to verify their formal correctness.
 - New P-GRADE component producing a portal compatible workflow starting from data provided by users. This workflow is handled as any other workflow of P-GRADE.
 - The result is easy accessible as downloadable file.
 - There is a “superuser” that can access al already computed models
- Improvements of FRANEC: the values of some fundamental parameters requested to run pipelines are automatically generated and fed to FRANEC through input files.
- The users need to concentrate only on scientific aspects (parameters) required by pipeline runs.
- The construction of appropriate P-GRADE compatible workflows remains in charge of the application..



Next Steps

- Interfacing the BaSTI DB and the Grid and integrating BaSTI in P-GRADE.
 - Users may easily discover already existing stellar evolutionary models.
 - Users will access the data using Virtual Observatory standards.
 - Not already existing evolutionary models can be generated through new simulation runs. New generated models are stored in a hidden instance of BaSTI to be validated, normalized and, if appropriate, brought in the official database instance.
- Parametric runs with fixed values for a set of K parameters and values ranging in predefined intervals for the remaining set of N-K parameters (e.g. run of X jobs with different values of the mass).
- Use of robot certificates to ease users in approaching and using the portal and the underlying Grid infrastructure.