

An example of GSG tools integration: Starlight Spectral Synthesis Code.

Printable Summary

Starlight Spectral Synthesis Code is widely used by several astrophysics research groups specialized in extragalactic astronomy to estimate physical properties of galaxies. Due to this situation, Grid Computation and Extragalactic Astronomy Departments of the IAA have collaborated to develop a toolbox that helps scientists use Grid Computing intensively and to optimize its use. In this article we present all the migration details of the Starlight Spectral Synthesis Code to Grid infrastructure. Furthermore we present the study of the optimizations made to use this code in Grid Computing, showing improvements, problems and anecdotes found while using this infrastructure.

Description of the work

Starlight Spectral Synthesis Code is used intensively, so we are looking for solutions to decrease the computation time in every spectra analysis. We have estimated around a thousand spectra for each galaxy, and 30 minutes for each spectrum analysis, so to analyze a complete galaxy we will spend a total computation time of 500 hours. It is pretended to study thousands of galaxies so it is not possible to run the analysis in a sequential computation environment. This is the reason to use a distributed computation platform. There are several alternatives to run the Starlight Spectral Synthesis Code in a distributed infrastructure, as HPC, Volunteer Computation, Cluster Computing, or Grid, because it is very easy to chop it into small pieces of code. However, Grid Infrastructure is the best option due to it comprises several nodes, which contain several available slots where these code pieces can be run. Starlight Spectral Synthesis Code is not a completely stable software due to the investigation requirements: there are new items to investigate as time goes by so the software has to be modified or extended, so new versions appear constantly. Moreover, this code was modified and parallelized to be used under Grid computing. Due its unstability each new version has to be ported to Grid Computing. IAA Grid Computing Department can do it immediately because of their proximity to IAA Extragalactic Astronomy Department, so the Starlight Spectral Synthesis Code is contained in the IAA Grid node. But the portability to the rest of Grid nodes is more complicated. To do so we have studied another solutions.

Link for further information

<https://grid.iaa.csic.es>

Wider impact of this work

Is it worth running Starlight Code in Grid environment?

Considering the runtime: The total running time improves if compared with the sequential way, including implicit times of overhead in Grid Infrastructure.

Considering the reliability: GSC tool utility to detect fail or aborted jobs makes more robust Starlight portability avoiding losses in the analysis results.

Considering the ease of use: Due to StarLight integration through GSG tools, an easy management has been achieved using directories, so the final user can find the data easily.

Considering the development of Starlight Code in Grid Infrastructure: The Starlight Code has been integrated with the modular GSG tool. This modularity makes easier to add new functionalities and to modify the existing ones, leaving the door opened to further development of StarLight Code in Grid.

But nothing is perfect: On the other hand there are potential improvements especially when we look for the total utilization of Grid Infrastructure.

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