

CAVIAR, Cardio Vascular Image Analysis on gRid

Wednesday 9 May 2007 17:30 (20 minutes)

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).

The progress of image acquisition devices makes possible to better explore the dynamics of moving organs such as the heart. The CAVIAR project objective is to exploit the huge computing power of grid architectures in time consuming cardio-vascular 4D image analysis applications (huge amount of data typically around 0.5GB per patient and per examination) such as cardio-vascular 3D+time structure segmentation and motion tracking.

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.

Parallel versions of spatio-temporal motion estimation and segmentation methods from Magnetic Resonance Image sequences have been developed (multithreaded and MPI versions) and first deployed on PC clusters. In a second step, they are currently ported on the EGEE grid. Security and confidentiality of processed data must be insured. Also grid services should enable the parallel execution of application softwares through MPI, in particular when processing one specific case. However the full interest of the grid would be evident when processing several cases in parallel.

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)

Our plan is to develop a web portal to remotely access tools developed in the context of the CAVIAR Project

- to conduct first tests on clinical data
- to evaluate the feasibility of massive experimental data processing

It is essential however to be able to execute MPI based parallel programs which would

require the development of specific node/cluster selection mechanisms.

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

Grid architectures offer the opportunity to run the image analysis programs on large sets of patient data, allowing for large scale inter-patient cardio-vascular (CV) studies and comparisons. The complex analysis programs can not be run on standard PC architectures with the great amount of data and require high computing power.

Developments using grids can thus help for :

- construction of CV atlases for normal and pathological cases
- analysis of patient specific data with prior atlases and providing faster diagnostic results
- epidemiologic studies on populations suffering from CV pathologies, still one of the leading cause of mortality in Europe.

Such a principle can be envisaged in other applications involving image analysis tasks like in image sequence indexing and retrieval or geographical and satellite image analysis.

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