

EGEETomo: 3D electron tomography on EGEE. A user-friendly and fault-tolerant grid application.

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3D Electron Tomography is a key imaging technique when studying large biological complexes like cells organelles or even whole cells structures. Projection images of the specimen are taken through electron microscopes. Nevertheless, technical limitations reduce the number and quality of the projections that can be obtained from the specimen under study. Because of this, the commonly used reconstruction algorithms, like WBP, which are relatively fast, present some limitations in terms of the reconstruction quality they provide. On the other hand, the iterative reconstruction techniques provide better reconstruction quality but at a much higher computational cost. Fortunately, the whole reconstruction task can be divided into smaller, independent, reconstruction subtasks. This makes the grid a perfect place to run tomographic reconstructions, with hundred of long-lasting independent tasks. Nevertheless, making such application usable implies making it user-friendly and fault-tolerant.

3. Impact

Previous works have shown that EGEE grid platform is well suited to perform reconstruction tomographies. Nevertheless, command-line interfaces as well as the need to closely monitor grid tasks status, prevents the grid to be broadly used by non grid-trained users. This fact motivated this work as an improvement on grid usability for the tomographic reconstruction application. This was done through three main points; (a) user interaction through a GUI hides the grid commands complexity and shows the information in a very readable, interactive way, (b) fault tolerance: The grid is huge, different points of the grid fail at some time making our jobs to fail and our stored data to temporarily be inaccessible. Data replication as well as jobs monitoring is vital, and (c) automatic process: Since the moment the user enters needed data and pushes the go-ahead button, the whole process will run automatically, detecting and solving problems through fault-tolerance techniques.

URL for further information:

<http://bioinformatics.oxfordjournals.org/cgi/content/abstract/btm459v1>

4. Conclusions / Future plans

Preliminary tests have shown that the application performs well in an unstable environment like a big grid. Graphical user interface provides a fast learning curve for new users while completely hides the grid complexity. The user interaction with the grid is limited to entering the proxy password at the beginning of the session. Grid applications should not be limited to using the grid to do something but doing it in a comfortable and fault-tolerant way.

Provide a set of generic keywords that define your contribution (e.g. Data Management, Workflows, High Energy Physics)

3D Reconstruction, Iterative Reconstruction Algorithms, Grid Usability, Fault-Tolerance,

1. Short overview

EGEETomo is a new, easy-to-use grid application for performing three-dimensional tomographic reconstructions on the EGEE grid. Special emphasis has been put on making this application user-friendly and fault-tolerant. User-friendly applications are not usually the norm on grid applications, which can make non-trained users to avoid adopting new technologies like the grid. Also, the unstable nature of the grid makes fault-tolerance implementation a must-have on grid applications.

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