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Problem Solving Environment for stereological modeling of muscle cells

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From the viewpoint of grid computing, SM-PSE requires:

Computing Intensive Parametric Studies: The created cell tools enable users to repetitively create hundreds of huge models, which, consecutively, will be stereologically verified. The computation of volume and surface densities of a single model can take up to hours; i. e., computation of all the models would last for days.

Heterogeneous Computing Platform Support: Visualization rendering platform is limited to Windows OS. Therefore, combining model solving with model visualization on Windows platform has to be provided. Moreover, rendering requirements are not the only ones that define the platform demands. Several existing tools, capable of working with stereological data that are considered to extend our PSE are available also solely on the Windows platform.

3. Impact

EGEE infrastructure utilizing the gLite middleware and MEDIGRID middleware were identified as the ideal solutions for computationally intensive model verification tasks and for multi-platform infrastructure support (visualization on Windows platform), respectively. Each of those middlewares provide different tools and different APIs. This might be quite confusing for the user and impedes construction and execution of the grid activity workflow, spanning both middlewares. Interoperability of the two middlewares is required at the level of job submission and data exchange. We address interoperability by providing specialized MEDIGRID job service (gL-service) that can submit jobs to gLite powered infrastructure and transforms the job state of a gLite job to MEDIGRID job state while the computation is running. The user can thus use MEDIGRID toolkits and APIs to manage the jobs in MEDIGRID based infrastructure as well as in gLite based infrastructure.

URL for further information:

http://www.sccg.sk/~parulek/cell/

4. Conclusions / Future plans

Presented effort is still work-in-progress. Compute intensive tasks in the development version were tested in Gilda testbed. Before moving to the production environment, specialized, application specific portlets have to be developed to facilitate the utilization for end users, and thorough evaluation of middlewares interoperability modules has to be conducted. We plan to move to the production environment in the first quarter of 2008; the application will be used in VOCE VO.

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

Biomedicine, Molecular Physiology, Implicit surfaces, middleware interoperability

1. Short overview

The presented work is aimed at creation, verification and visualization of muscle cell models. Generated cell models should meet the requirements established by stereological measurements of real cell images. These requirements necessitate evaluation of volume and surface densities, which is a rather time consuming process, requiring grid computational power. In addition, visual inspection of the model is necessary to reveal possible morphological and structural inconsistencies.

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