Contribution ID: **145** Type: **demo presentation**

E-Marketplace Model Integrated with Logistics (EMMIL)

Wednesday 9 May 2007 19:30 (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 EMMIL model represents a new type of B2B electronic marketplace with a new kind of bid structure that allows buyers, sellers and third party logistics service providers (3PL) to take part in the same transaction aiming at buying-selling and delivering tangible goods of homogeneous kinds. The new structure involves an optimization process that is much more complex than the ones currently in use.This project is carried out on the SEEGRID infrastructure using the gLite middleware.

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.

The grid version of the EMMIL model is developed under the P-GRADE portal release 2.5 that can support parameter sweep applications. The organization of EMMIL on the Grid is basically a parameter sweep application consisting of three main parts. The first part contains the so-called generator jobs that are used to generate and place the required input parameter sets into a given storage element of the grid.

The 2nd part is a workflow to be executed as many times as many input sets are generated by the generator jobs. We use a realistic business constraint, namely that despite the high number of bidding sellers the buyer wants to establish partnership with only a limited number of partners. The 3rd part finds the best solution and generates output.

The key services are the broker and the built-in workflow manager of the portal. The portal hides the orchestration of the jobs and workflows in the parameter sweep application.

With a forward look to future evolution, discuss the issues you have encountered (or that you expect) in using the EGEE infrastructure. Wherever possi-

ble, point out the experience limitations (both in terms of existing services or missing functionality)

The first grid solution implements the simplified auction model where only line-haul delivery is allowed and full market is assumed. It is also assumed that a best 3PL can be found from each seller. In the following versions this limitations will be resolved one by one. Meanwhile running the application we found several problems in the infrastructure: 1. File catalogue entries may become incoherent with accessible files on SEs. 2. Unspecified stochastic refusal of correct jobs from the WMS.

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

The mathematical foundation of the EMMIL model has been laid down for the buyer-oriented type of EMMIL, where a powerful buyer issues a request for proposal followed by bidding of sellers and 3PLs. The new three sided auction model involves a new cost model for transportation separating fix and variable costs.

The suggested model leads to a non-linear optimization problem where the objective function is discontinuous so the non-linear solvers do not work. Linearisation is possible at the price of a massive increase in the number of variables. The mixed integer programming problem we get can be so big that it results in a computation time infeasible for a web auction. To shorten the processing time a parallel computational model has been developed and a grid based solution has been tested.

The potential user community consists of companies who want to buy, sell and deliver products via an e-marketplace.

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Session Classification: Poster and Demo Session