

An Integrated System of ABM and GIS With GRID Computing

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Abstract

In order to integrate efficiently multi-agent based model and GIS and to promote the performance of computing, this paper put forward a framework of GRID ABGIS (Figure 1). Firstly, we link the repast and ARCGIS by a middleware, in which information are exchanged and renovated by GML files. Secondly, we extend the repast to a GRID enable software by using GRID middleware technology. Lastly, we build a simple land-use model basing the GRID ABGIS framework and evaluate the computing performance.

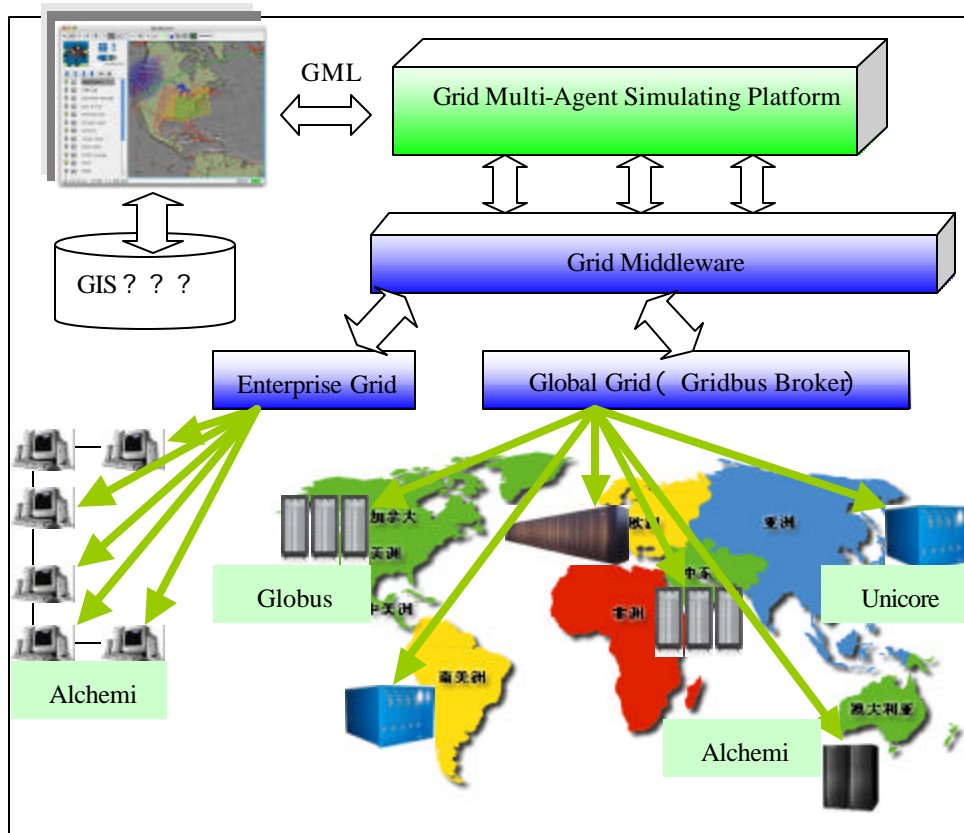
Introduction

In current researches on ABM-GIS integration, Software implementation technologies are emphasized very much. From "the loosest" to "the tightest" in the spectrum of ABM-GIS tightness, five integrating approaches, including data exchange approach, ABM centered approach, GIS centered approach, middleware approach and whole integrated agent-based GIS approach are put forward and reviewed (Brown, 2004; Benenson & Torrens, 2004; Gimblett, 2002). However, it is probably more important to uniform the existing ABM software and GIS software in the level of data model. We need explore and develop a common temporal-spatial data model to integrate ABM's temporal and causal analysis and GIS's locational and topological analysis. GML, Geography Markup Language, provides an open framework for the definition of geospatial application schemas and objects, including coordinate, topology, temporal information and dynamic features. Therefore, we try to develop a middleware to link Repast and ARCGIS by using the GML files as the carriers of information flows between them, which will renovate the

database in one side when the statuses in the other side change.

One of the other problems is the computing performance of ABM-GIS integrated system. We develop another middleware to lay the ABM-GIS system on the GRID by using Alchemi, which is a GRID middleware developed by Grid Computing and Distributed Systems Laboratory, The University of Melbourne, Australia (Luther,2003,2004).

Lastly, we build a simple land-use model basing the GRID ABGIS framework and evaluate the computing performance in GRID testbed .



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