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Trading Computing Resources across gLite and XtreemOS Platforms

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The objective of this work is to present a system that facilitates the commercialization of Grid resources through a Virtual Marketplace of computational resources, where a seller is capable of listing the Grid resources, and buyer can request/bid dynamically for required computing resources for their applications.
This model exploits the benefits of Grid computing, especially the inter-operability and scalability of Grid platforms. Interoperability is achieved by using the OGF SAGA standard on two Grid platforms: XtreemOS, a Linux-based Grid OS, and gLite, a Grid middleware.

Detailed analysis

Our trading system is a virtual marketplace of resources that comprises three layers:
The user-application layer, the top layer, allows end-users to submit applications to the deployed resources after analysing economical and performance related information.
The virtual market place layer is the middle layer that implements trading services anddynamically schedule applications on Grid resources. Scheduling depends on criteria such as cost, processing power, execution time or resource availability.
The resource management layer is the bottom layer that manages the Grid resources used by the end users.
Our implementation leverages on existing technologies such as trading algorithms, grid middlewares/OS and API for Grid applications.
Monitoring services inform the trading service about cost and performance of Grid resources. Monitoring is achieved by either direct or indirect capture of resource status and pre-defined events. The indirect interface uses logs generated at run-time by the Grid infrastructure. The direct interface is a portal collecting dynamically events generated by monitoring services associated to the Grid infrastructure.

Conclusions and Future Work

Our work answers questions such as “which Grid should be used that will minimize cost along with achieving efficient applications’execution time?”, “how end-user can select Grid resources according to pre-defined policies, including cost policies?”and “how to achieve interoperability when using gLite and XtreemOS platforms?”.
Our trading system provides a portal for end users to avail the computing power of Grid resources, depending on economical and performance parameters. In future, we plan to extend our system considering ecological parameters such as power consumption.

Impact

The main benefit of this system is to integrate in a single framework four key features: cost saving for end-user, dynamic scheduling, interoperability, and elasticity.
Cost saving for end users is guaranteed by allocating the applications to the more economical resource(s), following policies defined by the end users.

Dynamic scheduling is achieved through the virtual marketplace, which implements scheduling algorithms that allocates applications following classical performance parameter as well as the cost of resource usage.

Interoperability is achieved by using a standard programmable interface, the Simple API for Grid Application (SAGA), to bridge the gap between existing grid middleware and application level needs. The same system could run on XtreemOS or gLite Grids, or interoperate on Grids using resources from both platforms.

Elasticity is provided within the Grid as our system enables adding and deleting resources dynamically. In addition, resource prices can change on the fly, and such changes are taken into account by the virtual marketplace.

Keywords

Grid Middleware, Virtual Resource Market Place, Grid Applications, Workload Management

URL for further information

http://www.xtreemos.eu/

Primary author: Dr CHOUHAN, Pushpinder (STFC)

Co-authors: Dr ARENAS, Alvaro (STFC); Mr MCDERMOTT, Andrew (STFC); Mr TRIGG, Nick (STFC)

Presenter: Dr CHOUHAN, Pushpinder (STFC)

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