CoreGRID

European research network on foundations, software infrastructures and applications for large-scale, distributed Grid and peer-to-peer technologies

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Grid Application Fact Sheet

Advance Reservation of Compute and Networking Resources in the Grid with QoS Guarantees for MPI-applications

We present an MPI-application that demonstrates user-driven co-allocation and advance reservation of compute and network resources. The user specifies the co-allocation describing his application in the UNICORE client. The MetaScheduling Service then negotiates the resource usage with the local scheduling systems and the network resource management system. The simulation presented is using the allocated resources.
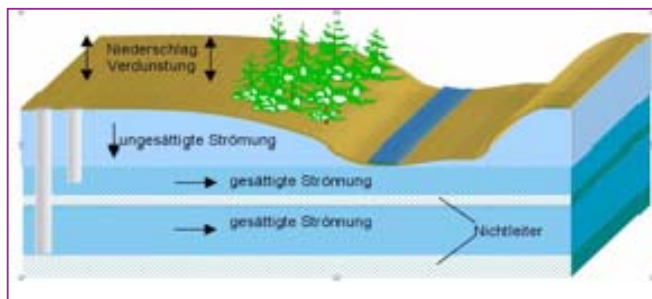
Watch the demo and you will see:

- ❖ User-driven co-allocation and advance reservation of compute and network resources for a single distributed application
- ❖ The simulation of pollutant transport in groundwater using these resources
- ❖ The difference in performance achieved with and without bandwidth reservation

More details:

The simulation of pollutant transport in groundwater is a distributed, parallel message-passing application. The performance metric of this application, i.e. the run time for a simulation, depends on the number of processors that might be used to execute the application. Using additional resources of the Grid, like compute clusters, is suitable to increase the performance of the application. However, the user has to assure that all resources are available at the same time. Typically, clusters are not idle due to the local load, and the individual state of the batch queues at different clusters will cause different start times of the separate components of an application. To solve this coordination problem, a MetaScheduling Service has been developed, that is able to negotiate with the local scheduling systems to find and to reserve a common time slot to execute the application. Additionally, the QoS of the external network connections is negotiated and reserved between the cluster nodes on different clusters at the same time using a dedicated resource management system for the network resources.

Developed by: Fraunhofer Institute for Algorithms and Scientific Computing
Contact: Wolfgang Ziegler (Wolfgang.Ziegler@scai.fraunhofer.de)

Fraunhofer Institute
Algorithms and
Scientific Computing

www.coregrid.net

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