R&D Information

World's First Successful Demonstration of Dynamic Reservation of Resources for Grid Computing

NTT, the Grid Technology Center of the National Institute of Advanced Industrial Science and Technology (AIST), the National Institute of Information and Communications Technology (NICT), and KDDI R&D Laboratories Inc. (KDDI R&D Labs.) have performed the world's first successful experiment on dynamic configuration of an information processing Grid over a GMPLS-based network (GMPLS: generalized multiprotocol label switching).

A Grid is a technology that utilizes a network according to requests from users by utilizing various kinds of resources, such as computers, storage devices, and observation devices, which are geographically distributed. It enables to provide an infrastructure where these resources can be used in a flexible, simple, integrated, and efficient manner. However, until now, computing and network resources have been managed independently of each other, and e-mail or phone call exchanges have been required in advance to enable the network equipment to be adequately configured in order to reserve optical paths among computing resources in remote sites. Thus, it has been difficult to combine various resources dynamically and effectively to establish a Grid.

To overcome this problem, an architectural framework that allows fully autonomous reservation of both computing and network resources is beneficial. This can be achieved by defining an interface between a Grid resource scheduler (GRS), which reserves overall resources, and a network resource management system (NRM), which flexibly establishes optical paths, and by making interworking between GRS and NRM possible. To enable users to receive services from multiple network operators, the interface between GRS and NRM should be a common one.

In the experiment, NTT, AIST, and KDDI R&D Labs. collaborated on the basic functional specifications for an information interface between a GRS and an NRM. NICT developed technologies for the operation and management of the GMPLS network, which is currently undergoing standardization of the optical path control, and collaborated with KDDI R&D Labs. and NTT in order to achieve the desired services.

The experiment demonstrated for the first time in the world the successful establishment of a Grid as an information processing infrastructure through the use of advance reservation of both the computing and network resources required by users. That is, the GRS and NRM interworked to enable fully autonomous reservation of the optical paths required to establish the Grid in a GMPLS network environment. Its effectiveness was confirmed by executing scientific calculations over it.

NTT, AIST, and KDDI R&D Labs. plan to draft more detailed specifications for the interface used here between the GRS and NRM with the aim of making it an open and international standard. This technology will open the way to Grids of globally distributed computers and storage devices that can provide various kinds of services. At the same time, NICT is seeking to optimize the GMPLS network for various types of applications and plans to continue its R&D efforts in operation and management technologies.