

# Cyberinfrastructure in Korea

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## Abstract

In this paper, we report experiences and results of the integration and utilization of cyberinfrastructure for sciences in Korea. An overview is given of the current and planned uses of cyberinfrastructure which consists of grid, networks and e-Science project.

*Key words:* grid; network; e-Science

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## 1. Introduction

Now science is becoming a team sports [1]. Easy problems are solved and challenging problems require large resources, particularly knowledge from many discipline. There is an amazing advances in information technology such as Moore's law and widespread use of IT(Information Science) in science. Now computational science becomes the third way of science. Now it is IT(Information Technology) based science environment.

The first example is high energy physics. High energy physics is to study fundamental constituents of matter and basic principles of interactions between them. We need giant accelerators and deal with huge amount of data such as a few Pbyte/year with collaborations. Therefore, we need distributed analysis of data.

The second example is a national virtual observatory. Astronomical surveys produces of images and catalogs. Datasets will cover the sky in different wavebands. There are breakthroughs in telescope, detector and computer technology. Quantity of data collected doubles every 18 months. Discovery will be

done by data mining. Therefore, for these sciences we need cyberinfrastructure.

The anatomy of cyberinfrastructure consists of resources, middleware and user environments. Resources are computers, storage, instrument and visualization. Middleware is for resource allocation, information service, security, data management and resource monitoring. The user environment is for BT(Bio Technology), NT(Nano Technology) and ST(Space Technology). In this article, the current status and activities on the construction and utilization of the cyberinfrastructure which contains grid, networks and e-Science project will be described.

## 2. Grid infrastructure

The construction of the K\*Grid infrastructure which is the nationwide grid project in Korea is divided into two phases.

The first phase (2002-2004) is for constructing grid testbeds and providing basic grid services from computing centers and university laboratories. As the interests in grid have increased, the demand for the production level grid infrastructure has been rapidly growing not only from users form K\*Grid project, but also form related projects such as, e-Science project of Korea and KoCED (Korea Con-

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struction Engineering Development) project.

The second phase (2005-2006) of the K\*Grid infrastructure is the result of such requirements. Its objective is to construct a reliable grid service infrastructure of TFLOPS level. At present, three institutes, SNU(Seoul National University), PNU(Pusan National University) and KISTI(Korea Institute of Science and Technology Information) are involved. We are making invaluable efforts for sharing high-performance computing resources.

K\*Grid portal, web-based Grid service platform for providing easy-to-use environment to user, has been developed based on Java and web service technology. It is expected to play a pivotal role in R&D in Korea as the research and development of cyber-infrastructure of Korea.

AG(Access Grid) activity in Korea started at 2002 as a part of K\*Grid project. AG infrastructure of Korea started as one room type node at KISTI, and developed into six room type and over fifty PIG(Personal Interface to the Access Grid) nodes which are actively used in such areas as e-Science, bioinformatics, medicine and meteorology.

Research on Grid application has been done as a part of the K\*Grid project, too. Its primary goal is to develop grid-based application to improve the quality of service via grid technology and to gather requirements from various applications for further research. Scientific application has been the major focus until 2004, then its focus has been shifted to IT applications such as on-line game service, telematics navigation service and rendering service.

We also construct EGEE [2] platform called gLite for middleware test and high energy physics such as the ALICE experiment.

### 3. Networks

KREONET(Korea Research Environment Open Network) is Korea's national science and research network funded by MOST(Ministry of Science and Technology) since 1988. There is 5~20 Gbps backbone and 1~10Gbps access networks. There are around 200 connected organization and 100,000 users.

GLORIAD(GLObal RIng Network for Advanced Applications Development) is for international connections. There are two 10 Gbps. One is between Korea and US. The other is between Korea and China. GLORIAD is the first round-the-world high-performance networks jointly estab-

lished with optical networking tools that improve networked collaboration with e-Science and Grid applications. The line has been linked with Seattle(USA), Calgary, Toronto(Canada), Chicago, New York City(Canada), Amsterdam(The Netherlands), Moscow, Novosibirsk, Khabarovsk(Russia), Beijing, Hong Kong(China), Daejeon(Korea) and Seattle(USA).

### 4. Korea e-Science Project

The main focus of the K\*Grid project is for the construction of next generation Internet and business applications. A little attention is given to scientific applications. In order to complete the situation, Korea e-Science project started by MOST(Ministry of Science and Technology) of Korea with the intention of providing advanced collaborative environments to researchers distributed over the country.

Currently advanced environments or problem solving environments, are being constructed in five application areas(nano technology, bio technology, aerospace, equipment control and meteorology) as a part of the Korea e-Science project. Each application will be developed using common application support software and infrastructures which was built by the K\*Grid. Although it will take three years to complete the environments, test service of the environments will be by 2006.

As a part of the Korea e-Science project, workflow, visualization and user portal are main focused software areas. It is intended to be made as general as possible so that they can be used in other application projects and among other related communities.

### 5. Summary

This paper shows the anatomy of cyberinfrastructure which consists of resources, middleware and user environment. We described the current status of cyberinfrastructure in Korea.

### References

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