Brief summary of results of Workshops "Developing E-Science in Asia"

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"DEVELOPING E-SCIENCE IN ASIA" WORKSHOP

- **10:00 – 10:25 Introduction, Dr. Han-Wei YEN (Eric Yen)**

  Academia Sinica Grid Computing Centre (ASGC), Taipei, Taiwan
- **10:25 – 11:00 Why e-Science in Asia, Dr. Simon C. Lin, Academia Sinica Grid Computing Centre (ASGC), Taipei, Taiwan**
- **11:00 – 11:50 Discussion**
- **12:00-13:00 Lunch**
- **13:20 – 13:50 Developing e-Science in Mongolia, Prof.B.Sukhbaatar , Dr.Sc, SICT, MUST**
- **13:50 – 14:10 Discussion**

"DEVELOPING E-SCIENCE IN ASIA" WORKSHOP

- **14:10-14:40 Integrated Information Network of MAS, Academician, Dr.Sc. D.Amarsaikhan, Dr. B.Nergui, Institute of Informatics, Mongolian Academy of Science**
- **14:40-15:10 Discussion**
- **15:10-15:30 National Data Center in Mongolia, Yu. Ulaankhuu, P.Battur, National Data Center of Mongolia**
- **15:30-16:00 Discussion**
- **16:00-16:30 Cloudcomputing in Mongolia: Problems and Possibilities, G.Oyunbayar, G-Mobile Corporation**
- **16:30-17:00 Discussion & Closing remarks**

Brief information

- 35 participants from mainly ICT&Research Institutions:
- Institute Informatics, MAS
- Mongolian University of Science and Technology
- Ministry of Education, Culture and Science
- 5 international participants
- Timing: started at 10.10 and finished 16.30

Introduction to e-Science

Mr. Eric Yen, Research Scientist, Academia Sinica Grid Computing Centre (ASGC), Taiwan

e-Science is the new research paradigm by taking advantages of the exponential growth of **information and communication technology.** The vision is to accelerate knowledge sharing and to speedup the advancement of **science discovery based on the new computation capability** on large data sets. Sharing and collaboration are the essences of e-Science to realize that the whole is greater than the sum of parts. Data deluge drives the evolution of e-Science paradigm with the requirements of scientists to mine, search and analyze data in **near real time.** Management of exponentially growing distributed data and share of diverse data types from different disciplines demands a **new distributed computing infrastructure (DCI) to tackle the e-Science** challenges.

Grid-based DCI such as WLCG (Worldwide LHC Computing Grid) and **EGEE (Enabling Grid for E-sciencE)/EGI (European Grid Initiative)** emerged from early 2000s is to implement the vision of e-Science . In EGI era and the commencement of LHC from 2010, the largest global DCI already stably supports **1M jobs per day, 100 Petabyte data per year and 80Gbps peak traffic for various e-Science applications in the world.** Although there is still gap for Asia regional e-Science Infrastructure (e-Infrastructure) application and coverage, the e-Science environment in Asia based on EGEE Asia Federation and **EUAsiaGrid** have becoming part of the worldwide DCI, and also supporting many routine **e-Science collaborations such as drug discovery, bioinformatics, earthquake disaster mitigation, weather simulation, social simulation, and high energy physics.**

In the past ten years, 38 resource centres in 15 countries joined the regional and global e-Science collaborations coordinated by the Asia Pacific Regional Operation Centre (APROC) operated by ASGC. 80% of them are active in general and reached over 90% average reliability since November 2010. Around 15,000 CPU cores, 5 Petabyte disk storage and 4 Petabyte tape capacity are pooled together and consolidated as part of the worldwide DCI. The regional e-Infrastructure is able to support 62,000 jobs a day, 80,000 CPU-Hours a day and around 10 Petabyte data flow in March 2011. **High energy physics is the largest user community and resource consumer for the moment.** EUAsia is the catch-all VO in this region to provide versatile e-Science collaborations. In addition, as an indispensible component of e-Infrastructure, most regional resource centres are connected through APAN, ASGCNet and other regional broadband networks such as TEIN for the e-Infrastructure.

e-Science is to support the combination of simple tools to answer complex questions, and is creating revolution in scientific capability for everybody. By addressing the common needs, **ASGC is building a bottom-up South-East Asia regional collaboration with the help of EU e-Infrastructure on disaster mitigations.**

Why e-Science in Asia

Dr. Simon C. Lin, Project Director of the ASGC
(Academia Sinica Grid Computing Centre)

e-Science is actually underpinning a creativity machine to support the **new computation capability for researches** everywhere in any scale rather than focusing on big sciences only. In Asia, e-Infrastructure opens a great opportunity for this region **to share the data, service, tool, resource and scientific results,** collaborate on common needs, science frontier and human sustainability and urgent research topics. **Disaster mitigation is the most pressing and common concerns in this region as Asia** is vulnerable to compounded catastrophes. **Earthquake, storm and flood are the three most** devastating hazards of this region according to the studies. By reusable and generalized core services of scientific workflow, an **e-Science application environment is attainable for many disciplines to share the same infrastructure, tools, resources, and methodologies.**

Under the framework built by **EUAsiaGrid,** we've been successfully implemented the e-Science applications on **drug discovery, seismological hazard mitigation, weather simulation, tsunami propagation analysis, and social simulation.** By close cooperation with scientists, the e-Infrastructure is employed to support researchers on underlying sciences and facilitate the formal process of quantitative hazard assessment, including much accurate and high-performance simulation on risk analysis and preparedness, fast reporting and data sharing etc.

What have been done upon EUAsiaGrid framework is not only porting scientific applications but also establishing research oriented production services and **long-term scientific collaborations among partners**. **By addressing the common concerns such as natural disaster mitigation, it has been setup the e-Science collaboration milestone in this region.** In Asia, e-Science for the Masses is more strategic than big sciences alone.

Developing E-Science in Mongolia

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4 July, 2011

Contents

High Performance Computing needs for Mongolia

At present the following fields of science and technology in Mongolia require high computing power urgently:

- *Engineering simulations*
- *Nuclear physics*
- *Nanotechnology*
- *Cancer research*
- *Computer graphics and animation*
- *Weather research and forecasting*
- *Yellow dusty storm research*
- *Seismic data processing*

Environmental Problems for Mongolia

- **Natural Environment Protection**
- **Natural resources management**
- **Climate changes**
- **Land degradation and desertification**
- **Mining industry and environmental issues**
- **Water**
- **Air pollution in Ulaanbaatar and other cities**
- **Natural disasters**
- **…..**

E-Science can be collaborative research tool in solving above problems.

Theme for 11th SCA Conference is “Combating Land Degradation in Asia

Land degradation has been recognized as a global problem associated with desertification in arid, semi-arid and dry sub-humid zones in Asia. Mongolia is one of the countries suffering from severe pasture degradation.

E-Science can be collaborative research tool in areas of combating land degradation and desertification.

Conclusions

- Mongolia should join international cooperations and activities on e-science immediately. Examples: Academia Sinica Grid Computing Centre, Asia Cloud Computing Association, EUAsiaGrid, CHAIN, EGI, TEIN3…with individual countries etc.
- Mongolia should define and start e-science projects which enables sharing of expensive equipment, scientific instruments, computing resources, or key databases of scientific information.

Conclusions

- e-Science is changing the ways in which research is done and education is the only way to enable transition to these new methods. This process then has a fundamental impact on research and teaching methods in research and educational institutions.
- We need to seed and disseminate information on e-science in Mongolia.
- We need to define the areas of collaborations on e-science with international partners including with Asian countries, especially with Taiwan.
- E-Science can be collaborative research tool in areas of combating land degradation.

INTEGRATED INFORMATION NETWORK OF MONGOLIAN ACADEMY OF SCIENCES

D.Amarsaikhan and B.Nergui

Institute of Informatics
Mongolian Academy of Sciences

OUTLINE

- Introduction
- History of the information network of the MAS
- Current situation of the ICT development of the MAS
- The problems to be solved in the sector
- Conclusions
-

Despite the recent rapid development in ICT, Mongolia it is still facing some specific problems:

- **There is no protection from the Internet hackers to provide information security.**
- **Unsatisfactory optimization/rationalization of the local network, insufficient modern equipment and permanent network congestion due to power cut or unintentional human actions.**
- **Inexperienced/not well-skilled network administrators and their insufficiency.**

Cont…

- There are **no professionals** able to conduct research and processing of security and there are no high educational establishments to train them.
- There is **no stable investment** to develop information technology both in universities and the Mongolian Academy of Sciences where, for example, investment in this field has not been made for the last four years.

Some activities towards solution of the problems

- There is a very urgent need for conversion of the existing data sets into a digital format and creation of the integrated information network of the MAS.
- To solve this problem, a collaboration in being made with Russian Academy Sciences.
- MONGRID association (MAS, NUM, MUST) has been established and is working toward the efficient development of cloud computing in Mongolia.
- 2 specialists were trained at Nuclear Research Institute in Dubna, Russia.
- Currently, MONGRID association is working toward the establishment of a training GRID system in August 2011.

Conclusions

- **Facing the current demands for existing academic data and cultural information there is an urgent need to develop a proper and fully operational integrated information network of the MAS.**

National Data Center in Mongolia

13th of June, 2011

Table of Contents

Current works

1. Services

Government services:

- Government organizations domain name, web/mail service
  GOV.MN

Other services:

- Web site creation service
- Web / mail hosting service
- Server rent service
- Server hosting service
- Data backup service
- IT training

11th CONFERENCE OF THE
SCIENCE COUNCIL OF ASIA

‘CLOUDCOMPUTING IN MONGOLIA: PROBLEMS AND POSSIBILITIES’

Developing E-Science in ASIA

G. Oyunbayar, G-Mobile LLC
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Problems

- There is no HPC/GRID/Cloud(private/public) Service in Mongolia*. But we have extra capacity
- No regulation in HPC/GRID/Cloud (CRC)
- Braindrain to developed countries.
- Entities continue to invest to Separate servers, datacenters. Example: MECS is making DC**.
- Small entities cannot keep skilled specialists.
- Recently no support for HPC/Cloud proposals: 2 times to ICTPA, 1 to PoM, to business: Mobicon, Unitel, MCS Electronics.
- * except of Meteo Agency. ** Datacenter

No	Phases	Target	Application	Users
1	I: 2011	10 Teraflops, 2 HPCs, MonGRID	Weather forecasting, Seismic, CompGraphics, simulation: nano and bio tech, economy, statistics	Online Job submission, Governm organizations, users
2	II: 2012-2013	+200 TFlops, K*Grid, APGrid, MonCloud, private clouds	Real-time processing, modeling, simulation	Pay as You use basis.
3	III: 2014-	WorldGrid, Moncloud, Cloudcomputing	e-health, e-education, e-government, e-business, e-Job, e-science, market research and forecasting, others. Use advantage of Mongolian condition in HPC powering	Every citizen of Mongolia, and other world. Supercomputing and cloudcomputing resources of the World are open for Mongolian users.

Conclusions and Recommendations

- E-Science can be collaborative research tool in areas of combating land degradation and desertification.
- Asian countries can join international cooperations and activities on e-science. Examples: Academia Sinica Grid Computing Centre, Asia Cloud Computing Association, EUAsiaGrid, CHAIN, EGI, TEIN3…with individual countries etc.
- We recommend that SCA initiate project on e-science which enables sharing of expensive equipment, scientific instruments, computing resources, or key databases of scientific information.

Conclusions and Recommendations

- We need to seed and disseminate information on e-science throughout Asia.
- We recommend that define the areas of collaborations on e-science with international partners including with Asian countries, especially with Taiwan.
- E-Science can be collaborative research tool in areas of high energy physics, earthquake, environmental pollution, weather forecasting, combating land degradation…etc.
- SCA should consider E-Science as best cooperation tool among member countries.


Thank you
Links