The Academic Grid (A-Grid)

A Learning and Discovery Grid: Its Motivation and Future Plans

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Outline

• Introduction to A-Grid
• Motivation and Future Plans of A-GRID
• MYREN Phase 2
• Concluding remarks
Academic Grid (A-GRID) as A Learning and Discovery GRID

- A-Grid acts as:
  - a platform for students to learn about Grid Computing, and
  - an infrastructure of distributed/Grid computing for e-learning
- Community development
- An initiative among Institutions of Higher Learning under Ministry of Higher Education
Academic Grid (A-GRID) as A Learning and Discovery GRID

• Motivation
  – Academic staffs, research officers/assistants, and graduate students **made up of over 80% of the entire research community in Malaysia**! (Not including undergraduates)
  – Working on Grid computing and its application in various disciplines
  – Requires minimal facilities in their labs of respective universities to carry out their R&D
  – Need something that they can “play around” and should anything happens to the facilities (eg. Nodes crashing, hanging, etc) they can simply poweroff and restart!
Academic Grid (A-GRID) as A Learning and Discovery GRID

- Basically two types of users:
  - Researchers/students doing research on certain aspects of GRID
  - Researchers/students using GRID for computation; (Bioinformatics, Cheminformatics, Medical Informatics)
- Need basic Grid facilities and have total control of the entire Grid Ecosystem (all aspects of Grid)
- After acquiring certain level of expertise or if they want more compute power, then they can tap on other production facilities
- Hence the need for a learning and discovery Grid
Academic Grid...A Bit of History

- Research on parallel/distributed computing since 1990’s
- A proposal for National Centre for Scientific Computing (NCSC) championed by UM was not able to secure support by the then Ministry of Science, Technology and Environment (MOSTE) in 2000
- Early initiative called EMAS-GRID linking small clusters at USM, UKM and UM carrying out bioinformatics research in 2003-4
- Another project, TEMAN (Testbed Environment for Multimedia Application and Networking (2001-2) was established and shifted to TEMAN II initiative which eventually becomes MYREN (2005).
- Malaysian researchers have for a long time recognised the importance of HPCs and Grid computing
Academic Grid Initiative

• First meeting to discuss about the formation of Academic Grid among institutions of higher learning under Ministry of Higher Education was held on 28 September 2007
• Representatives from several universities attended the meeting gave updates of Grid activities in respective universities
• Agreed unanimously on the formation of Academic Grid to support teaching and learning of Grid and sharing of knowledge and resources among universities
• Agreed on several issues and came up with suggestions and future plans
Academic Grid…cont.

- Generally, some universities have long been involved in Grid R&D and its application in several domains (Lifesciences, Pharmacy, Chemistry, Physics, Mathematics)
- But some universities are still at very initial stage and have only a few clustered PCs BUT they are very enthusiastic researchers and students
- Some universities have already assembled a number of small clusters of HPCs and SMPs for internal use but they are not connected together
- Researchers are reluctant to share the resources; even among research groups within a university
Academic Grid...Suggestions

- Universities already having cluster(s) on campus will explore if it/they can be shared and linked together using MYREN
- Universities are to develop Grid Policies to facilitate and encourage sharing of resources with security guarantee
- Universities with greater experience and knowledge on Grid should help the lesser universities
- All universities should be committed and support each other towards the success of Academic Grid
Academic Grid: Further actions

• Each University should form Campus Grid linking clusters of HPCs, SMPs and PCs.
• Campus Grids will be connected together via MYREN
• A-Grid Operation Centre (A-GOC) will be formed (USM has agreed in principle)
• Some of the A-Grid facilities will be on production Grid and can peer with facilities at MIMOS or other Grid partners internationally via TEIN2, INTERNET2, and other networks
• Addressing redundancy
Academic Grid: Future plans…

- Buy-in and awareness campaign among universities on Grid science and technology together with EUAsiaGrid Partners
- Establishment of Malaysia Grid Forum Society (MGF) under Registrar of Society (Protem Exco formed and held first meeting, constitution drafted, in the process of submission for registration)
- Organising First Malaysia Grid Forum Conference 2008 – Scholarly and peer-reviewed
- Affiliating MGF with OGF
Academic Grid: Future plans...

- Besides supporting typical domains such as lifesciences, pure and applied sciences, edutainment, and finance, greater emphasis will be on two other domains:
  - Humanities Grid (Arts, Culture and Heritage)
  - E-Learning Grid
- Data Grid for digital archives, learning objects, etc
- Fully supports EUAsiaGrid initiative
Organizational Model of A-Grid

RI’s= Research Institutes
MYREN Work Programme

Dedicated network supporting NREN activities and collaborative research – broadband capacity, video conferencing, linkage to other NREN

Network Infrastructure

Human Capital Programme

Network Operations

Central technical coordination, network operation, helpdesk, network monitoring & management etc.

MYREN Work Programme

Research Communities

MYREN

International Partners

Student placement, technical training series, Industry-MYREN joint talks, virtual lectures, seminars
Management Model

2005-2007 Build Phase
Establishing & linking MYREN to the user communities.

2008-2010 Growth Phase
Progressing and expanding the benefits of MYREN to wider user communities.

2011-2015 Sustaining Phase
Continue progressing MYREN towards higher adoption, value creation and community-driven initiative.
Status Update
MYREN Research Community

MYREN Research Chairman

Network Research
- Prof. Dr. Borhan Md Ali
- E-Security WG
- IPv6 Security WG
- Wireless/WSN WG
  - IPv6 Routing WG
  - IPv6 Communications WG
  - IPv6 Monitoring WG
- Routing & NMM WG
  - MYREN NOC
- Network Quality of Service WG
  - Dr Phang
- Software engineering BoF

IPv6
- A/Prof. Dr Sureswaran
- IPv6 WG
  - A/Prof. Ewe Hong Tat
- Virtual reality & Immersive Tech WG
- Interface Design and Ambient Intelligence (IDAI)

Multimedia Apps
- A/Prof. Dr Su Haimi Napis
- E-learning WG
- Information Retrieval WG

E-Research
- A/Prof. Dr Su Haimi Napis
- Knowledge Mgmt
  - Prof. Tengku Mohd T Sembok

Mgmt Science & Tech WG
- A/Prof. Dr Suhaidi Hassan
- Accounting Info System BoF
- E-Supply Chain BoF
- Decision Modeling BoF
- Econometrics BoF
- Open Source WG

High Performance Cyber Design
- Dr Mamun Reaz
- VLSI/MEMS BoF
- Automotive CAE BoF
- Distributive Computing Tech & Design
- BioMedical Computing BoF

Proposed new grouping
Humanware...not Hardware!

- Revisiting and reemphasising what was already said in earlier presentations
- Cloud computing and virtualization: virtual cluster and contextualization
- Academia vs Industry
  - Research on grid technology vs cluster scheduling
  - How to satisfy both?
- Community driven Grid
- “Easy to assemble machines to go to petaflops but very hard to assemble people to share their resources” - Prof Satoshi Matsuoka
Concluding Remarks

• Universities do not have enough resources to build massive compute facilities but should have sandbox, pre-production and also production Grid

• A small but modest compute facilities where students have the freedom to try out new things without fear of wrecking a big Grid system should be available

• If bigger and faster compute resource is needed for individual researchers, then they can send jobs to other partners outside the A-Grid

• After graduating from the A-Grid, students will have the skills and ready to move on to a bigger facility
Concluding Remarks

- Academic Grid IS a Learning and Discovery Grid
- Provide a platform and compute facilities where students and academics learn about Grid technology and its applications,
- Promote TRUST and CONFIDENCE and encourage sharing for example by implementing and acculturating Federation (e.g., VOMS or GridShib, User Certificates) and developing policies for harmonization of Raw and Clean Data coming from various disciplines
- Provide a single point of contact for peering partners for universities
- Most importantly contribute towards the development of skilled Grid human resource necessary to support National Grid Initiative
Give them the Grid they compute today
Teach them the Grid they compute everyday!

NO TRUST
NO GRID!
TQ 😊