EGI-InSPIRE

APGI ANNUAL REPORT

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Abstract

The Asia Pacific Grid Initiative (APGI) has 9 partners from the Asia Pacific region. These partners have continued with their unfunded project activities that vary greatly in scale and scope from country to country. This report details their diverse activities over PY4. The supported user communities are primarily contributing to environmental science, natural disaster mitigation, life science and High Energy Physics.

I. COPYRIGHT NOTICE

II. DELIVERY SLIP

	Name	**Partner/Activity**	**Date**
From	Vicky Huang	ASGC/NA1	15 April 2014
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III. DOCUMENT LOG

Issue	Date	Comment	Author/Partner
1	02-04-2014	Initial draft	Vicky Huang/ASGC
2	18-04-2014	Second draft	Vicky Huang/ASGC
3	28-05-2014	Final version for AMB/PMB review	Vicky Huang/ASGC

IV. APPLICATION AREA

This document is a formal deliverable for the European Commission, applicable to all members of the EGI-InSPIRE project, beneficiaries and Joint Research Unit members, as well as its collaborating projects.

V. DOCUMENT AMENDMENT PROCEDURE

Amendments, comments and suggestions should be sent to the authors. The procedures documented in the EGI-InSPIRE "Document Management Procedure" will be followed:
https://wiki.egi.eu/wiki/Procedures

VI. TERMINOLOGY

Various term definitions are available in the EGI Glossary at: https://wiki.egi.eu/wiki/Glossary; acronyms are defined at http://www.egi.eu/about/glossary/.

VII. PROJECT SUMMARY

To support science and innovation, a lasting operational model for e-Science is needed − both for coordinating the infrastructure and for delivering integrated services that cross national borders.

The EGI-InSPIRE project will support the transition from a project-based system to a sustainable pan-European e-Infrastructure, by supporting 'grids' of high-performance computing (HPC) and high-throughput computing (HTC) resources. EGI-InSPIRE will also be ideally placed to integrate new Distributed Computing Infrastructures (DCIs) such as clouds, supercomputing networks and desktop grids, to benefit user communities within the European Research Area.

EGI-InSPIRE will collect user requirements and provide support for the current and potential new user communities, for example within the ESFRI projects. Additional support will also be given to the current heavy users of the infrastructure, such as high energy physics, computational chemistry and life sciences, as they move their critical services and tools from a centralised support model to one driven by their own individual communities.

The objectives of the project are:

1. The continued operation and expansion of today's production infrastructure by transitioning to a governance model and operational infrastructure that can be increasingly sustained outside of specific project funding.
2. The continued support of researchers within Europe and their international collaborators that are using the current production infrastructure.
3. The support for current heavy users of the infrastructure in earth science, astronomy and astrophysics, fusion, computational chemistry and materials science technology, life sciences and high energy physics as they move to sustainable support models for their own communities.
4. Interfaces that expand access to new user communities including new potential heavy users of the infrastructure from the ESFRI projects.
5. Mechanisms to integrate existing infrastructure providers in Europe and around the world into the production infrastructure, so as to provide transparent access to all authorised users.
6. Establish processes and procedures to allow the integration of new DCI technologies (e.g. clouds, volunteer desktop grids) and heterogeneous resources (e.g. HTC and HPC) into a seamless production infrastructure as they mature and demonstrate value to the EGI community.

The EGI community is a federation of independent national and community resource providers, whose resources support specific research communities and international collaborators both within Europe and worldwide. EGI.eu, coordinator of EGI-InSPIRE, brings together partner institutions established within the community to provide a set of essential human and technical services that enable secure integrated access to distributed resources on behalf of the community.

The production infrastructure supports Virtual Research Communities (VRCs) − structured international user communities − that are grouped into specific research domains. VRCs are formally represented within EGI at both a technical and strategic level

VIII. EXECUTIVE SUMMARY

The Asia Pacific Grid Initiative (APGI) has 9 partners from the Asia Pacific region including Australia, Indonesia, Japan, Rep. of Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand. This report details their diverse activities over PY4. The APGI is led by ASGC which serves as the liaison between the EGI-InSPIRE Project Office and APGI partners and represents them in the EGI-InSPIRE Project Management Board.

In PY4 ASGC focused on e-Science applications and big data analytics as well as providing user support to the applications of HEP, bioinformatics and biomedicine, natural disaster mitigation, In PY4, ASGC established major accomplishments in especially the natural disaster mitigation and successfully reach out and contact with local (Tainan, Taiwan) and international user communities in Philippines and Japan.

ASTI continued with its activities on High Performance Computing, upgrading of the computing facility and procurement of new storage and servers for 2014. ASTI kept engaging with local partners such as state universities and research organizations, as well as international communities such as PRAGMA and PandaGrid.

ITB has established engagement with new communities involving the Astronomy Department at ITB and the National Institute of Sciences (LIPI). The ID-ITB resource centre was again upgraded using new middleware from the EMI distribution. The coordination of user communities (namely weather forecast, disaster mitigation and computational chemistry), which were formerly supported by the EUAsiaGrid project, as well as of other user communities that could benefit from the use of e-Infrastructures, was ensured.

KEK kept its focus on High Energy Physics. EMI-1 was deployed as a part of the Central Computer System and mostly used by researchers in particle physics, especially, the new research collaborations focusing on the Belle/Belle II project and the International Linear Collider (ILC). Belle II is utilizing the Grid computing infrastructure mainly composed of EMI for designing their detector and preparing the data analysis. Currently, Belle II is planning to start its data acquisition in the end of 2016, and it is expected that the grid platform enabled by the EMI distribution, will be more heavily used in the coming years.

For the HEP area, KISTI is spending effort to expand the CPU and Tape resources to meet the 2014 pledged resource requirement of ~31,000 HEPSpec-06 capacity provided by about 2,500 cores and 2 PB of Tape capacity.

KISTI is also continuing the previous year's operation of supporting the France-Asia Virtual Organization (VO), has continued its operation in collaboration with CC-IN2P3 in France and is expected to utilize the France-Asia VO more heavily in 2014 to fully exploit the resources made available to the VO, in order to help enable the development of new grid applications such as a large-scale drug repositioning problem, which has been solicited for help from some user communities in Korea.

The NECTEC/NSTDA activities are remaining focused on contributing to the "Thailand National e-Science Infrastructure Consortium" project[1], which is a five-year national e-Infrastructure for e-Science, organised through a consortium of research institutes supported by a total budget of USD $3.7Million.

The National University of Singapore (NUS) is now party to and committed to more than several million dollar funds to participate in the National Supercomputing Centre (NSCC). University Grid will be integrated into the new national research and education network SINGAREN into a cloud and now, an integrated supercomputing network. NSCC is a large initiative aiming at provisioning for up to 1 PetaFLOP of computational power, which will be available to various stakeholders in Singapore from Research Institutes to Universities to adopt computational thinking in their respective fields and to translated computational techniques and apply it to their own domain of expertise.

The Australian EGI-InSPIRE activities saw the establishment of a Centre of Excellence for Particle Physics at the Terascale (CoEPP) that brings together theoretical and experimental physicists from across Australia's leading universities and has assumed the management role of Australia's

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[1] http://www.e-science.in.th

contribution to the EGI-InSPIRE partnership. This includes running the Australian ATLAS Tier 2 centre for WLCG and their engagement in the National eResearch Collaboration Tools and Resources (NeCTAR) Research Cloud to move grid services onto cloud infrastructure and utilize the storage that will be provided by the nationally funded Research Data Storage Infrastructure (RDSI). The CoEPP Research Computing team had another successful year of delivering reliable computing resources to the Worldwide LHC Computing Grid (WLCG) in 2013. The Australian-ATLAS Tier 2 grid site delivered on 99% of our computation pledge to the ATLAS experiment with 98.6% reliability and 97.6 availability rating, as well as providing 800 TB of grid storage.

The UPM is now the lead institution of Academic Grid Malaysia with the support of the Ministry of Science, Technology and Innovation (MOSTI). The National Centre for Particle Physics (NCPP) was established in 2013 by Malaysia Science Academy, Ministry of Science, Technology and Innovation (MOSTI) in collaboration with University of Malaya. As has been highlighted in the community engagement, several grid user and administrator training events were organized in the context of the Academic Grid Malaysia, with the aim of providing supports to existing and prospective users in various disciplines, from structural biology to engineering.

The Asia Pacific overall infrastructures expanded with two additional Resource Centres that were certified in India and South Korea respectively.

A Memorandum of Understanding between EGI.eu and the consortium of Asia Pacific partners represented by ASGC was established in 2014 to pave the way towards a long-term collaboration between EGI and e-Infrastructures in Asia Pacific. ASGC is an Associated Participant of the EGI Council.

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1. INTRODUCTION

The nine partners from the Asia Pacific region in the EGI-InSPIRE continued with their unfunded project activities that contribute to the production infrastructure and the user support activities taking place across the region within the 4th EGI-InSPIRE project year. This report details their activities taking place across the region through their various national initiatives, with a special focus on user support and engagement.

The partners of the collaboration include:

- Taiwan (ASGC)
- Japan (KEK)
- Republic of Korea (KISTI)
- Australia (UNIMELB)
- Singapore (NUS)
- Philippines (ASTI)
- Indonesia (ITB)
- Thailand (NECTEC)
- Malaysia (UPM).

2. ACADEMIA SINICA GRID COMPUTING CENTRE (ASGC)

2.1. ACTIVITY SUMMARY

2.1.1. WP2 – NA2 External Relations (Total PM: 12)

In the fourth year of the Project, both the EGI Technical Forum and Community Forum were participated. ASGC assisted the EGI Project Office to promote the Technical Forum and Community Forum in the Asia Pacific region, and coordinated with the PO regarding the communication and execution of financial supporting program to Asian Pacific partners. Eight delegates from 4 partners (Australia, Korea, Malaysia and Taiwan) attending the EGI Technical Form in Madrid, and 4 partners (AU, KR, MY and TW) will also attend the EGI Community Forum in Helsinki in May 2014

To disseminate the advanced e-Science knowledge to the potential user communities and give them the skills to deploy and use the e-Science infrastructure, ASGC has participated in the following international/local activities.

Table 1. Events organized during PY4

Date	Place	Events	Presentation / Dissemination
March 2014	Taiwan	ISGC 2014	(1) Computing and data Infrastructures – AP Region (2) E-Science Development in Asia: Past Experiences and Future Perspectives (Keynote Speech) (3) Disease-Wide Association Study Based on the Taiwan Health Insurance Record (4) Data Laws in Ancient Chinese Text
January 2014	Taiwan	3rd QCN Tainan Workshop	
	Philippines	P-alert Tutorial	
November 2013	Taiwan	2nd QCN Tainan Workshop	
September 2013	Taiwan	1st QCN Tainan Workshop	
June 2013	Germany	ISC13	
May 2013	Taiwan	National Cheng-chi University, Taipei	Cloud Computing & Big Data Analytics
		National Yang-Ming University	Challenge of Biomedical Big Data

In total, ASGC has organized 3 QCN Workshops, 1 P-Alert Tutorial, 1 international conference and 5 Grids/Clouds related Workshops including Security Workshop, dCache Workshop, e-Learning Workshop, ECAI Workshop and WeNMR Workshop.

The International Symposium on Grids and Clouds (ISGC 2014) is the major event that promotes grid and cloud technology for the support of multidisciplinary science worldwide. It was held at Academia Sinica in Taipei from 23 to 28 March 2014 with other 5 co-located events. The even enjoyed more

than 200 delegateds from 30 countries. The etailed Conference Program is available on-line at http://event.twgrid.org/isgc2014/program.html.

2.1.2. WP3 – NA3 User Community Coordination (Total PM: 30)

In the 4th year, ASGC continues focusing on e-Science applications and big data analytics as well as providing user support to the following disciplines:

High Energy Physics (HEP): The most important news in the last reporting period is that the Nobel Prize in Physics 2013 was awarded jointly to François Englert and Peter W. Higgs "for the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles, and which recently was confirmed through the discovery of the predicted fundamental particle, by the ATLAS and CMS experiments at CERN's Large Hadron Collider". As Rolf Heuer, CERN Director General, said: "Results are only possible due to extraordinary performance of accelerators – experiments – Grid computing".

ASGC continued supporting ATLAS and CMS which are the largest user communities in terms of the resource consumption. In the 4th reporting period, for ATLAS the inbound transfer data volume to ASGC reached 6,093 TB and outbound transfer volume from ASGC to other Tier-1/Tier-2 (T1 and T2) centres reached 3,397 TB. For CMS, the inbound transfer data size to Taiwan reached 201 TB and outbound transfer rate from Taiwan to other T1s and T2s reached 819 TB. Taiwan WLCG Tier-1 and Tier-2 Centres finished 11.2M jobs in the fourth EGI years.

Bioinformatics and Biomedics:
(1) WeNMR. ASGC continued to support WeNMR communities. A 1-day WeNMR Workshop was held in conjunction with ISGC 2014 with over 37 registered attendees. In addition to the WeNMR applications, the workshop promoted the interactively high throughput virtual screening service GVSS2.

(2) Drug Discovery. ASGC continued to support Drug Discovery communities, co-writing with Korea scholars, the paper "In Vitro Evaluation of Novel Inhibitors against the NS2B-NS3 Protease of Dengue Fever Virus Type 4" has been published in the last reporting period.

(3) Biomedicine. Thanks to the collaboration with the Taipei Medical University, ASGC has now access to the Taiwan National Health Insurance (NHI) records of 23 M people of age 0 to 100 from 2000 to 2002.This is a rare and unique dataset for the phenotypic disease analysis due to the non-statistically re-sampled nature and completeness of the population in Taiwan. The dataset is large, therefore the typical Cloud computing technique Map-Reduce is now employed to generate the necessary dataset for further analysis. A quantitative method was found that enables distinguishing of the common and rare diseases. The method is of great value to the decision support of public health policy. In addition, a new Data Law governs the disease comorbidity for any particular disease is also found. A web site is under implementation to enable researchers that allows to find all pair-wise diseases comorbidity in the demography of sex and all age groups.

Natural Disaster Mitigation:
(1) Earthquake: ASGC continued the collaboration with the Institute of Earth Science and Philippine Institute of Volcanology & Seismology (PHIVOLCS). The status of this collaboration are described as follows:
- one broadband seismic station – named PIPB – was constructed at the northern Luzon islands. Currently, there are 5 broadband stations being installed to continuously monitor seismic activity of the Manila Trench;
- the array response was evaluated and the ability of the plan South China Sea network was detected, according to analyzed results, it indicated that, in Luzon islands, installation of few seismic stations provided a significant improvement of the ability to detect earthquake and tsunami;

- 20 QCN sensors, 10 P-alert sensors and 2 servers were sent to PHIVOLCS;
- a P-Alert Tutorial was provided in PHIVOLCS.

In addition to the collaboration with Philippines, ASGC also invested a large huge amount of effort on promoting QCN (the Quick Catcher Network) in the Tainan area. The Quake Catcher Network is a collaborative, volunteer-based initiative for developing the world's largest, low-cost strong-motion seismic network by utilizing sensors attached to internet-connected computers. With the generous support of Rotary Club Taipei and Tainan Education Bureau, ASGC introduced the technology in 50 elementary schools in Tainan. In principle, 5 QCN sensors will be assigned to each school; among them, one sensor for collecting data and the other four for education purpose. Some schools will be equipped with more sensitive 16-bit QCN sensors. A series of training workshops, starting with the installation workshop and followed by the curriculum design workshop, will be planned. The purpose of the installation workshop is to assist teachers to install the QCN sensor whereas that of the curriculum design workshop is to assist teachers to use QCN sensor as a teaching aid and integrate into the local disaster mitigation curriculum. Other than organizing training workshops, the curriculum design competition and science project competition will be organized in 2015 and 2016 respectively. This is a 3-year project: in total, there will be 150 elementary schools in Tainan joining the QCN sensor network. In addition, the programme will be extended to other schools in the neighbouring countries such as Japan (Okinawa area) and the Philippines (Manila area).

(2) Tsunami Simulation: iCOMCOT is available at http://icomcot.twgrid.org. To integrate existing earthquake early warning systems with a fast calculation system for tsunami threats, iCOMCOT provides an efficient and low-cost tsunami fast calculation system for early warning. The iCOMCOT has been optimized and parallelized in order to meet the requirements of real-time simulation. It performs at least 10 times faster than the original COMCOT. In addition, a flexible and user-friendly grid/cloud-based portal service has been built, which is also made available for mobile devices. A paper on "Development of a Tsunami Early Warning System for the South China Sea" has been submitted to the Journal of Ocean Engineering in 2014.

(3) To further extend the collaboration between Taiwan and Thailand, a delegation led by Dr. Royal Chitradon from the Hydro and Agro Informatics Institute (HAII), Ministry of Science and Technology, Thailand visited ASGC. In the 2-day meeting, various e-Science collaborations including WRF application on climate change, typhoon prediction, QCN/P-alert for earthquake monitoring system, tsunami and storm surge simulation, etc. have discussed.

Humanities:
The ancient Chinese text is troublesome since there is no natural delimiter and no Latin-style grammar. However, the semantic structure may be reflected by the text structure. The materials chosen are the Ming Shilu, which literally means "veritable record for the Ming dynasty". These contain the imperial annals of the Ming and Qing emperors kept by an official committee of the time. To solve the problem, the material was segmented with different word lengths, from one character to four characters, and then the word distribution pattern was studied. Our results demonstrate power law distributions for various word-lengths, suggesting that ancient Chinese also follows Zipf's law in a subtle way, and may share some underlying mechanism with other languages.

2.1.3. WP4 – SA1 Operations (Total PM:48)
ASGC is operating the Asia Pacific Regional Operation Centre (APROC) to extend the EGI infrastructure in Asia Pacific region and maximise the e-Infrastructure reliability to support various e-Science user communities. At this moment, there are 22 production sites from 9 countries (complemented by 2 additional Resource Centres in China) joining 12 VOs in the EGI Asia Pacific regional infrastructure. Around 20,590 cores and 25 PB disk space are available from the Asia Pacific Resource Centres. Currently, there are 1,267 registered users according to the APGridPMA statistics in January 2014. In terms of normalised CPU time (HEPSPEC06), the monthly average resource

utilisation in this region is 60.4 M normalised CPU time (in HEPSPEC.hours). The daily average finished jobs have greatly increased from 49,408 in the first project year to 84,462 in the fourth project year, as illustrated in the following diagram.

APGI Resource Statistics (in CPU Time & #Jobs, 2011-2014)

Average	2011	2012	2013
HEPSPEC06.Hrs	25,785,233	33,347,626	53,689,009
#Jobs	2,252,385	2,006,817	2,372,504

$y = 35354x - 1E+09$
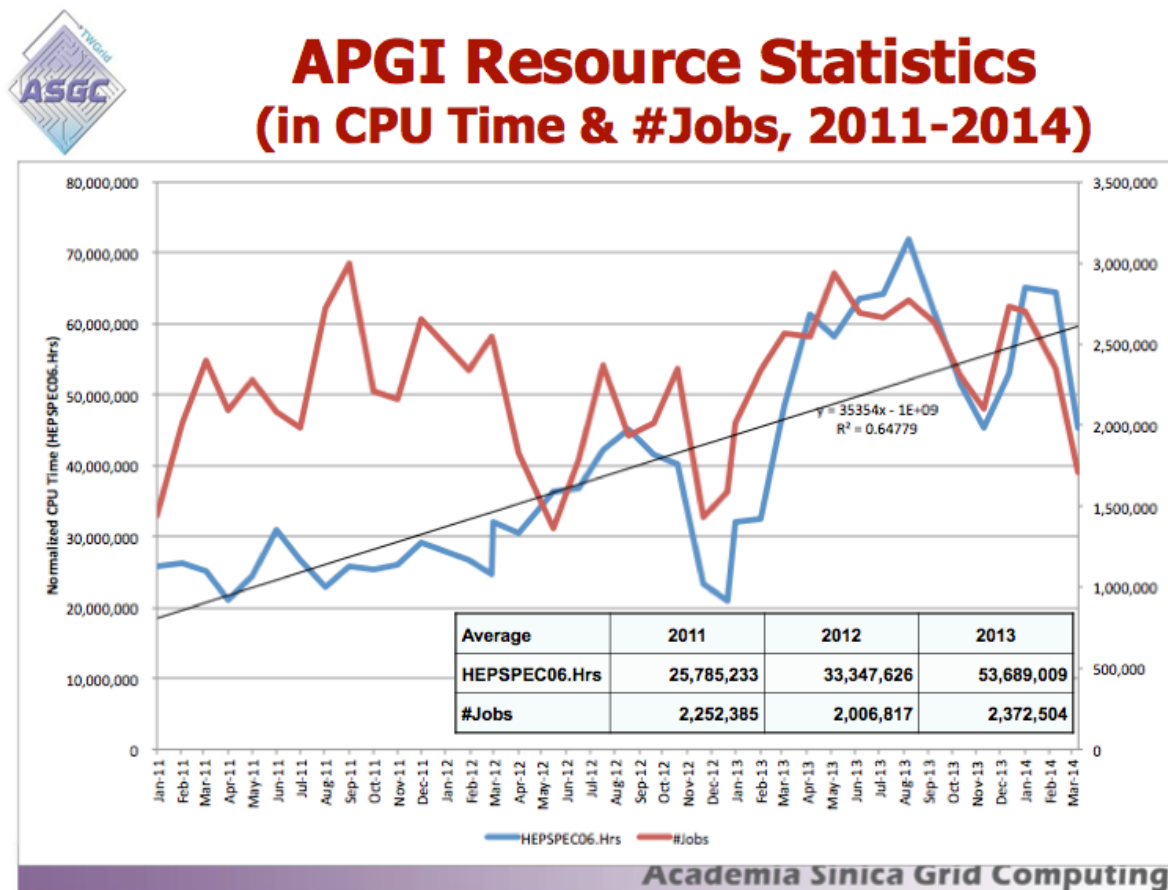$R^2 = 0.64779$

Academia Sinica Grid Computing

Figure 1. Resource utilization trend since the beginning of the EGI-InSPIRE project in the Asia Pacific region.

3. ADVANCED SCIENCE AND TECHNOLOGY INSTITUTE (ASTI)

3.1. ACTIVITY SUMMARY

ASTI continues to receive new requests for account creation in the local HPC facility. Since the facility reached maximum usage with all virtual cores allocated to various virtual clusters and standalone servers, this year we will be upgrading our facility and will be procuring new storage and computing servers. ASTI continues the collaboration with local partners such as state universities and research organizations as well as international communities such as EGI, PRAGMA and PandaGrid.

3.1.1. WP2 – NA2 External Relations (Total PM: 2)

ASTI was not able to conduct major dissemination activities for the use of the local HPC facility; effort was focused on assisting current HPC users, and accommodating new requests. We were able to create a "ASTI HPC Facility Group" in Facebook. Also, in the early part of March, a group of students from the University of the Philippines College of Computer Science together with their Instructor, visited ASTI and we were able to orient them on the HPC facility and what we do, and a tour to the HPC facility was also part of this activity.

3.1.2. WP3 – NA3 User Community Coordination (Total PM: 20)

The following user support activities were provided to users/collaborators/partners:

- A dedicated virtual cluster with 52 virtual cores was configured for our partners from the PAGASA (Philippine Atmospheric, Geophysical, and Astronomical Services Administration), the state weather bureau, for their research on the development of an ensemble of climate scenario simulations in the Philippines. This is a continuing activity from last year.
- A dedicated virtual cluster with 28 virtual cores was configured for users from the Ateneo de Manila University-Department of Environmental Science for their research using the Community Climate System Model v4. This is a continuing activity from last year.
- A multipurpose cluster was configured with 68 virtual cores to be shared among graduate students from the University of the Philippines Institute of Environmental Science and Meteorology, researchers from Philippine Genome Center, and scientists from the Manila Observatory. Applications running on the cluster include WRF, RegCM, and various Bioinformatics tools. This is a continuing activity from last year.
- The ASTI HPC facility now also hosts the Meteorological Data Archiving facility, which serves as a repository of meteorological data coming from various sources such as satellite, automatic weather stations, Doppler radar, and water level sensors. Users of the facility include researchers from the academe, the Project NOAH (Nationwide Operational Assessment of Hazards), and PAGASA, the state weather bureau. This is a continuing activity from last year.
- Following the visit from the students from the University of the Philippines College of Computer Science, we have already received new account request from at least four students, for their research project.

3.1.3. WP4 – SA1 Operations (Total PM: 20)

All security updates are applied as requested by the EGI security coordination team. Server certificates that expired were renewed last August 2012. ASTI's private cloud which hosts all service endpoints of PH-ASTI-LIKNAYAN is managed using the OpenNebula Cloud Operations Center web GUI. Since PH-ASTI-LIKNAYAN services are virtual machines that sit on ASTI's private cloud, it is very easy to backup or migrate these virtual machines in case hardware failure occurs on the physical hosts. PH-ASTI-LIKNAYAN service endpoints are all virtual machines running SL 5.6 and are hosted on ASTI's private cloud. The following table lists the certified production service endpoints of PH-ASTI-LIKNAYAN.

Table 2. Service end-points provided by ASTI.

Hostname	Production	Monitored	Visible to EGI
APEL - liknayan.pscigrid.gov.ph	Yes	Yes	Yes
CREAM-CE - liknayan.pscigrid.gov.ph	Yes	Yes	Yes
gLite-APEL - mon.pscigrid.gov.ph	Yes	Yes	Yes
Site-BDII - mon.pscigrid.gov.ph	Yes	Yes	Yes
SRM - se.pscigrid.gov.ph	Yes	Yes	Yes
UI - ui.pscigrid.gov.ph	Yes	Yes	Yes

In summary, ASTI was able to carry out the following activities:
- Continue to maintain and operate the ASTI Private Cloud and all the virtual clusters hosted therein;
- Contribute computing resources to EGI and PRAGMA;
- Provide technical support to partners and users;
- Maintain the Meteorological Data Archive System.

The plans of ASTI for the coming project year include the following activities.

- Hardware Side:
  - Expand the data center physical space and transfer the equipment to the new data center (On-going migration to the new Portable Modular Data Center located within ASTI premises).
  - Acquire additional compute and storage capacity (to commence in the 2nd Quarter of 2014 as we are currently awaiting the release of the funds for this).
  - Upgrade network infrastructure to Infiniband and 10G Interconnect (this shall be provided by another project on the setup of a Government Fiber Network).
  - Catalogue service for searching archived and real-time data.
  - Adopt standards for data access, storage, and sharing.
  - A knowledge-based portal using the Wiki application shall be established. This is easily accessible through the web. User training on data access and use of HPC facility, will likewise be provided.
- Management Side:
  - Update of website and other social networking sites for dissemination activities.
  - Hire at least four technical project staff to beef up our user support system.
  - Make our new accounts application process online.

4. INSTITUT TEKNOLOGI BANDUNG (ITB)

4.1. ACTIVITY SUMMARY

During PY4 the local teams engaged to support new disciplinary areas, under the lead of the Astronomy Department in ITB and the National Institute of Sciences (LIPI). The ID-ITB Resource Centre was again rebuild, and upgraded using EMI middleware. Lack of experienced site managers is slowing down this process.

4.1.1. WP2 – NA2 External Relations (Total PM: 1.64)

To do dissemination activity, experts or practitioner in grid computing technology are needed. The problem is that there are not so many people with grid expertise in Indonesia. Most researcher in Indonesia are still using cluster computing systems, which do not offer any resource sharing opportunity. Engagement with new researchers was mediated by the Astronomy Department in ITB and the Indonesian Institute of Sciences (LIPI). The ID-ITB site provides a user interface system that can be used by any user to access the Grid Infrastructure.

4.1.2. WP3 – NA3 User Community Coordination (Total PM: 5.67)

Communication and coordination with local users' community took place. In order to facilitate user communities in Indonesia, ITB provides a Grid site that is connected to the EUAsiaGrid network. This site is rebuild last year to the new middleware system.

Coordination with user communities that were involved with the EUAsiaGrid Project and other user communities that could benefit from the use of e-Infrastructures has been maintained. The user communities established from previous activities are those from Weather Forecast, Disaster Mitigation, and Computational Chemistry.

Researchers from Indonesian Institute of Sciences (LIPI) will provide a local cluster to collaborate with CERN in the ALICE project as a Virtual Organization (VO). We assist them to have user certificates needed to connect to the Grid Infrastructure. In the future, we are plannign to have closer discussion about the Grid infrastructure development and application.

The users from the Astronomy Department are in need for large computational resources in order to calculate the dynamic evolution of the Near-Earth Asteroid for prediction. The use of the grid infrastructure to support this application is being discussed. They are currently using their available cluster system, and possibly going to utilize the High Performance Computing Facility from the Computational Chemistry Department.

Technical Services done in the fouth year was the rebuild of the ID-ITB site and supporting the developemtn of High Performance Computing Facility operated by Computational Chemistry Department. The ID-ITB site upgrades are constrained by the lack of grid experts and shortage of manpower.

5. INTER-UNIVERSITY RESEARCH INSTITUTE CORPORATION HIGH ENERGY ACCELERATOR RESEARCH ORGANIZATION (KEK)

5.1. ACTIVITY SUMMARY

5.1.1. WP4 – SA1 Operations

KEK, the High Energy Accelerator Research Organization of Japan, is the government funded multidisciplinary laboratory covering particles physics, material science, bio-chemistry, etc. KEK has large scale accelerators used by many users across the world. EMI-1 was deployed as a part of the Central Computer System there and mostly used by researchers in particle physics, especially, Belle/Belle II and International Linear Collider (ILC). Belle is the experiment exploring CP-violation that has already completed its data acquisition phase. However, the data analysis is ongoing and still need large scale computing resources. Now the KEK B-Factory is being upgraded, more than 50 times more data is expected at Belle II. Belle II is utilizing the Grid computing infrastructure mainly relying on EMI middleware, for designing their detector and preparing the data analysis. While Belle II is an ongoing project, the Japanese HEP society has been willing to host the ILC in Japan. The computing resources used by ILC to design their detector were also accessed through the EMI environment made available through the Unified Middleware Distribution of EGI.

The overall scientific workload supported by KEK is indicated below. Several MC production campaigns both in Belle II and ILC massively contributed CPU from the Central Computer System at KEK.
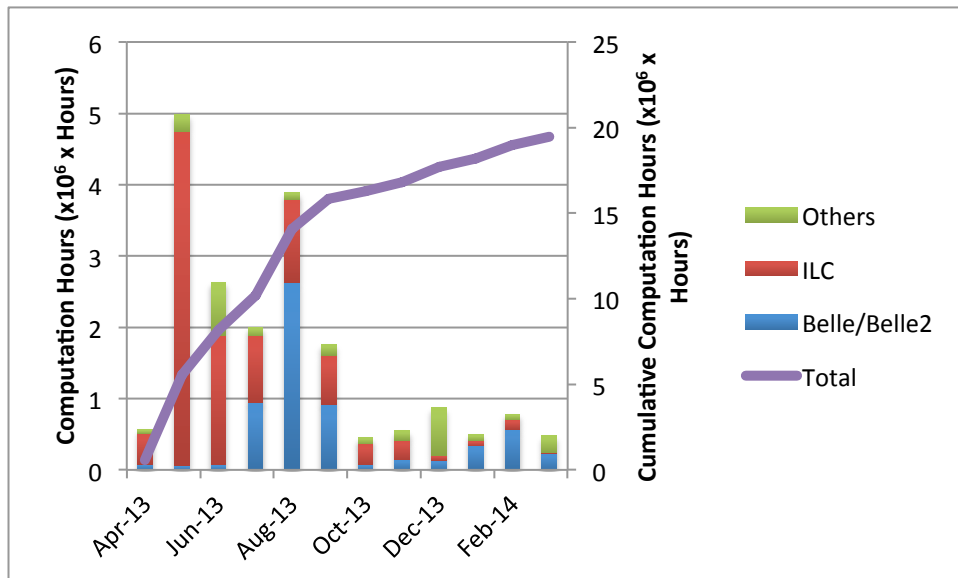
Figure 2. KEK CPU utilization during EGI-InSPIRE PY4.

It can be seen that the EMI environment was used a lot for research in Belle (including Belle II) and ILC. For StoRM as a storage management system, we have observed more than 0.5 PB of writing and 5 PB of reading during PY4.

Currently, Belle II is planning to start its data acquisition at the end of 2016. Towards the commissioning of Belle II, it is expect that grid utilization will be increasing. Belle II has chosen EMI as their Distributed Computing middlware and the support by EGI is necessary to operate the environment. The future of EMI and EGI is therefore critical to KEK.

6. KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY INFORMATION (KISTI)

6.1. ACTIVITY SUMMARY

6.1.1. WP4 – SA1 Operations (Total PM: 24)

During PY4, the KISTI ALICE Tier2 operation has been merged into part of the operation of KISTI ALICE Tier1 candidate, which was initially set up in July 2010 and has been managed by the KISTI GSDC (Global Science Data hub Center). A couple of fundamental requirements have yet to be met to become qualified as an official Tier1 for the ALICE experiment, including 10 Gbps of direct network connection between KISTI and CERN and 24-hour on-call support.

The following table shows the resources that KISTI has pledged to provide as a Tier-1 facility from 2012 to 2014. In 2013, KISTI has managed to fulfil the CPU pledge of 25,000 HS06 with about 2,000 CPU cores and the Disk pledge with 1,000 TB of disk space deployed. A total of 1,040 TB of Tape Storage has been deployed in 2013. KISTI is working for the expansion of the CPU and Tape resources to meet the 2014 WLCG pledged resource requirement of ~31,000 HS06 with ~2,500 cores and 2 PB of tape in 2014.

Table 3. Pledged resources for KISTI ALICE Tier-1 Resource Centre

	2012	2013	2014
CPU(HS06)	18,800	25,000	31,250
Disk(TB)	1,000	1,000	1,000
Tape(TB)	1,000	1,500	2,000

In continuation of the previous year's operation of the France-Asia VO Grid infrastructure, KISTI has continued its operation in collaboration with CC-IN2P3 in France. It is expected to utilize the France-Asia VO more heavily in 2014 to fully exploit its grid resources to enable the development of new grid applications such as a large-scale application for the drug repositioning problem, for which help in application porting was solicited from several user communities in Korea.

<Figure 1. e>
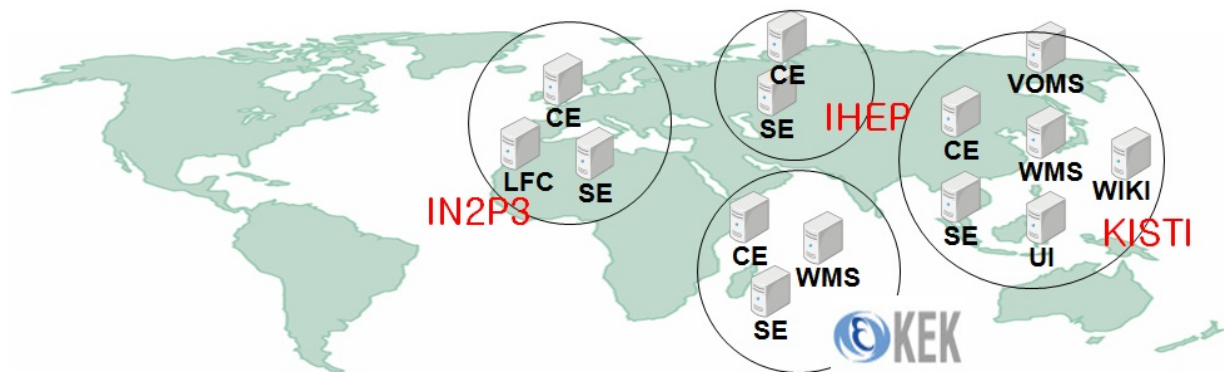
Figure 3. Infrastructure for the support of the France-Asia VO.

In addition to the France-Asia VO, KISTI, as part of testing and QA working group, has been working with the Geant4 collaboration to set up a Geant4 VO site to provide grid resources (~120 CPU cores) for physics validation for the Geant4 simulation toolkit to be released every 6 months.

7. NATIONAL SCIENCE AND TECHNOLOGY DEVELOPMENT AGENCY (NSTDA)

7.1. ACTIVITY SUMMARY

7.1.1. WP2 – NA2 External Relations (Total PM: 0.2)

During the 4th year project period, NECTEC/NSTDA continued its participation to both international and local events. The detailed activities are listed below:

- International activities:
  WLCG MOU signed on October 10, 2013
  NSTDA ALICE Tier2 : in production since April 2012
  SUT ALICE Tier2: still under configuration and testing
  NSTDA-CU CMS Tier2: still under configuration and testing
  ALICE Physics analysis and Tier-1/2 Workshop in 3-7 March 2014

- Local Activities:
  - Local Exhibitions:
    - PRAGMA 24, 21-22 March 2013, Bangkok, Thailand
    - 8th Siam Physic Congress, 22-23 March 2013, Chiangmai, Thailand
    - 17th International ANnual Symposium on Computational Science and Engineering, 27-29 March 2013, Khonkaen, Thailand
    - NSTDA Annual Conference 2013, 30 March – 3 April 2013, Thailand Science Park, Pathumthani
    - eHPC 2013 and JCSSE 2013, 29 - 31 May 2013, Khonkaen
    - 7th Conference of the Asian Consortium on Computational Material Science, 24 – 27 July 2013, Nakhon Ratchasima, Thailand

  - User Training events:
    - Electronic Structure Calculation for Molecular System using Gaussian 09 and Electronic Structure Calculation for Bulk Material using ABIBIT @ Khonkaen University, Khonkaen
    - Workshop on Computer-aided Molecular Design, 9-10 May 2013@ Chulalongkorn University, Bangkok
    - gWRF workshop in Thailand 2013 @ HAII, Bangkok
    - CUAHSI: Hydrologic Information System @NECTEC, Pathumthani

  - Workshop and PR:
    - Promote to Naresuan University @ Suranaree University of Technology, 15 March 2013
    - Workshop on Computer-aided Molecular Design@ Chulalongkorn University, Bangkok , 9-10 May 2013
    - eHPC2013 @ Khonkaen, 31 May 2013
    - INET Bangkok Conference @ Queen Sirikit National Convention Center, Bangkok, 8 June 2013
    - Faculty of Computer Engineering, School of Engineering, KMUTT, @ NECTEC, 2 May 2013
    - Faculty of Science, Thummasart University @ NECTEC, 12 July 2013
    - Faculty of Science @ Mae Fah Luang University, 21 June 2012
    - School of Science and Information Technology @ Walailak University, Nakhon Sri Thammarat, 18 July 2013

- http://www.e-science.in.th

7.1.2. WP3 – NA3 User Community Coordination (Total PM: 17.7)

Key actions of NECTEC/NSTDA were run as part of the "Thailand National e-Science Infrastructure Consortium" project ((http://www.e-science.in.th). The project description and progress since 2011 were presented in International Symposium on Grids and Clouds (ISGC) as part of the "E-Science activities in Asia Pacific" session.

Achievements in 2013:
- Three VOs have been approved by the Steering Committee, with research plans. These are
  ◦ Computational Science and Engineering, led by S. Vannarat, NECTEC/NSTDA
  ◦ High Energy Particle Physics, led by B. Asavapibhop, CU
  ◦ Computer Science and Engineering, led by T. Achalakul, KMUTT

- Resources and Services
  ◦ Total computing cores: 1,488 (360 cores were reported in ISGC 2013)
  ◦ Total storage: 350 TB (the same amount was reported in ISGC 2013)
  ◦ 2013 resource utilization: 4.1 million CPU-hr (1 OCT 2012 - 30 SEP 2013)
  ◦ 2012 resource utilization: 2.5 million CPU-hr (1 OCT 2011 - 30 SEP 2012)
  ◦ 2011 resource utilization: 1.3 million CPU-hr (1 OCT 2010 - 30 SEP 2011)

- Current active projects (as of Sep 2013)
  ◦ Computational Science and Engineering VO: 32 projects
  ◦ High Energy Particle Physics VO: 1 project
  ◦ Computer Science and Engineering VO: 4 projects

- NECTEC GOC CA services (member of APGrid-PMA)

8. NATIONAL UNIVERSITY OF SINGAPORE (NUS)

8.1. ACTIVITY SUMMARY

In the effort to stimulate the interest and usage of computational tools for Singapore, we are launching a National Supercomputing Centre (NSCC) above any national grid or cloud infrastructure. This multimillion dollar initiative (a grant of tens of millions of Euros is in the process of approval) will aim towards provisioning for up to 1 PetaFLOP of computational power for various stakeholders in Singapore, from Research Institutes to Universities, to adopt computational thinking in their respective fields and promote the adoption of computational techniques in their own scientific domain.

The participation to EGI-InSPIRE has benefited us in this heightened awareness of the importance of computing infrastructure and of the development of a higher level of competence in ICT to support e-Science. As grid and now cloud computing expertise is now mainstream in Singapore with large data centres being set up in Singapore with an estimated 50% of data centre business in Southeast Asia based in Singapore, many institutions are migrating to cloud services. In this 4th year of EGI-InSPIRE, the National University of Singapore is now party to and committed to more than several million dollar funds to participate in the NSCC. Our university Grid will be integrated into the new national research and education network SINGAREN into a cloud and now, an integrated supercomputing network.

8.1.1. WP4 – SA1 Operations

Grid has given way to cloud and we have implemented Cloud provisioning for student teaching in NUS as well as departmental cloud support for Research Data Management Policy compliance. Secure infrastructure is handled by Computer Centre NUS and the BIC IT team attached to LSI.

8.1.2. WP2 – NA2 External Relations

Many meetings have been conducted over the year, including presentations and representation to government. Publicity amongst students have resulted in increased awareness of the local HPC academy and our students from NUS and NTU have been selected for taking part in supercomputing application competitions. The NUS team participated for the first time, and was ranked 17th in the midst of strong global competitors.

Regular meetings have been set up for our NUS Supercomputing Task force to promote this effort. Potential Industry partners such as large corporations like Syngenta (Crop Genomics), Keppel (off shore marine and deep sea mining) and SMEs such as KOOPrime (genome informatics) have been engaged to line them up for provision of services to the private sector.

Going forward, we anticipate at least SGD 98 million for the national supercomputing centre from the government of which NUS is participating with a contribution of SGD 6.4 million for the next three years. Awareness promotion and capacity building has been successful and still ongoing as there is a strong base of non-users. Good interactions with industry are also very promising. Overall, we have very satisfactory progress.

9. UNIVERSITY OF MELBOURNE (UNIMELB)

9.1. ACTIVITY SUMMARY

The Centre of Excellence for Particle Physics at the Terascale (CoEPP) Research Computing team had another successful year of delivering reliable computing resources to the Worldwide LHC Computing Grid (WLCG) in 2013. The Australian-ATLAS Tier 2 grid site delivered on 99% of our computation pledge to the ATLAS experiment with 98.6% reliability and 97.6 availability rating, as well as providing 800 terabytes of grid storage.

During the LHC's Long Shutdown 1 it has been important for the grid computing infrastructure to not only remain fully operational but to grow in capacity to meet the physic programs, these include large scale Monte Carlo simulated event generation, raw data reprocessing and physics researcher analysis jobs. The Australian-ATLAS Tier 2 grid site was expanded proportionally to the requirements of the ATLAS experiment.

The capacity provided by the CoEPP's local computing resources for use by Australian CoEPP physicists was significantly enhanced during 2013, primarily through the deployment of virtual resources in the Australian Nectar Research Cloud and on the Research Data Storage Infrastructure (RDSI).

9.1.1. WP2 – NA2 External Relations (Total PM: 4)

Two presentations were made at CHEP2013 in Amsterdam:
- "Implementation of a GRID Tier-2 and general purpose computing clusters with Open Stack Cloud"
- "Dynamic TORQUE VM provisioning in a cloud environment".

In addition, a technical overview of our storage infrastructure was given at the Edinburgh DPM Workshop entitled "Australia Site Report" and the Belle II Computing/Software workshop meeting features a presentation on our "Federated Xrootd".

9.1.2. WP4 – SA1 Operations (Total PM: 68)

The Australian-ATLAS grid site saw two major hardware expansions in 2013. Our compute capability grew by 1000 HEPSPECs with the addition of 8 new Dell PowerEdge R620 multicore servers and our storage capacity expanded by 80 TB to 840 TB of grid connected storage.

Two major grid software upgrades were also performed in 2013 to ensure maximum performance, system security and grid compatibility. Firstly the middleware software stack which underpins all grid operations was migrated from gLite to the European Middleware Initiative 2.0 (EMI2) and secondly all cluster nodes and infrastructure nodes were upgraded from Scientific Linux 5.8 to Scientific Linux 6.4.

All the hardware and software upgrades during 2013 were achieved with minimal service interruption as our reported performance figures above show and this allowed us to complete over 2,600,000 grid jobs during the calendar year.

The Cloud team contributed to seamlessly integrate national research cloud resources based on OpenStack into CoEPP's infrastructures with minimal modification to existing system works. 400 extra CPU cores were initially added to CoEPP Tier 2 and Tier 3 resources in 2013. Both the Tier 2 grid infrastructure and Tier 3 local computing cluster are now able to automatically allocate and manage dynamic resources on the cloud on-demand. The cloud system is in fully functioning production and has been widely used by CoEPP theorists and experimentalists to run simulation and analysis jobs. Over 200,000 ATLAS Monte Carlo production jobs were completed on cloud over 2013. In August 2013 the Tier 3 system was augmented with cloud resources, leading to a 400 per cent improvement in system use.

10. UNIVERSITI PUTRA MALAYSIA (UPM)

10.1. ACTIVITY SUMMARY

The past year has been a rather tremendous year for Malaysia making good progress of the Academic Grid Malaysia Project.

10.1.1. WP2 – NA2 External Relations (4PM)

Community engagement was the main activity and generally the awareness among researchers and stakeholders is now much better, particularly on the impact and role of EGI-InSPIRE in the development of grid computing in Malaysia. Academic Grid Malaysia is fully committed to make EGI model as the blueprint to be followed by all grid infrastructure providers from various higher learning as well as research institutions.

All trainings and engagements that has been carried out and also planned in the future will be based on the EGI model. Furtherance to that, Malaysia is naturally committed to be part of the future EGI federated cloud initiative and is ready to take part in future EGI projects. Below is the list of events attended and/or organized in the form of training, symposia and visits that were successfully carried out by Academic Grid Malaysia.

Table 4. Events organized by Academic Grid Malaysia in EGI-InSPIRE PY4.

	Engagement	Venue	Date
1	Grid User Training	Universiti Tenaga National	11-13 Mar, 2013
2	Grid System Administrator Training	Nuclear Malaysia	22-25 Apr, 2013
3	Grid User Training	Universiti Putra Malaysia	1-2 July, 2013
4	Grid System Administrator Training	Universiti Sains Malaysia	3-5 Mar, 2014
5	Grid System Administrator Training	Universiti Malaysia Sabah	12-14 Mar, 2014
6	Grid Cloud Identity Summit 3-4 July 2013	Universiti Putra Malaysia	3-4 Jul, 2013
7	Technical visit to universities in Singapore to learn and exchange ideas	Nanyang Technical University and National University of Singapore	10-11 Feb, 2014
8	Visits to universities at Eastern State of Terengganu to explain about Academic Grid Malaysia and EGI	Universiti Malaysia Terengganu and Universiti Sultan Zainal Abidin	24-25 Fe, 2014

One important development in Malaysia in the year 2013 was the establishment of the National Centre for Particle Physics (NCPP) by Malaysia Science Academy, Ministry of Science, Technology and Innovation (MOSTI) in collaboration with University of Malaya. The establishment of NCPP is much welcome; the particle physics community will be a major driving force behind the establishment of the grid initiative.

Academic Grid Malaysia was involved since its inception and continue to do so until today, assisting in the development of their compute and network requirement with a view of establishing Complex Muon Solenoid (CMS) Tier 2 Site in Malaysia. Malaysia has sent several particle physics scientists and researchers to CERN to acquire the necessary knowledge and technical knowhow. Reciprocally, CERN scientists as well as other top-level officials have visited Malaysia and gave seminars in the effort to strengthen the collaboration. Presently, a substantial infrastructure (compute and storage) has been procured and installed, and it is now ready to undergo the EGI process for Resource Centre certification, to be conducted by the Academic Grid Malaysia.

10.1.2. WP4 – SA1 Operations (2PM)

Several grid user and administrator training events were carried out in the context of Academic Grid Malaysia providing supports to users/potential users in various disciplines, from structural biology, to engineering. Apart from supporting existing EGI certified sites with their periodical maintenance and trouble-shooting issues; Academic Grid Malaysia also has as outcome of its training events the grid certification of a cluster at the end of the event.

This year a cluster at Universiti Sains Malaysia has just been certified in EGI, and additional 144 cores were added after the training, increasing the total number of cores from 616 to 760 cores. Another training was done at Universiti Malaysia Sabah and at the present the site is still undergoing network settings. Additional compute capacity of about 128 cores will be made available.

The biggest new initiative for Malaysia is the development of a CMS Tier-2 Site at University of Malaysia, which currently contributes a total of 704 cores. After this certification, the Academic Grid Malaysia will have the potential compute power of over 1500 physical cores.

Malaysia also runs an IGTF approved National Certification Authority (CA) under the organization called Malaysian Identity Federation and Access Management (MyIFAM) that manages application and issuance of User Certificates, Host Certificates and Service certificates to people and sites participating in grid computing. MyIFAM has been busy for the past 12 months in providing the technical and administrative supports for users as well as researchers and grid developers on certificate-related issues. MyIFAM is also actively involved in Federated Identity initiative carrying out research and development on Level of Assurance for the community and having to do the balancing act between lower versus higher levels of assurance and ease of use. This is under a service called Secure Identity Federation on Unified Lightweigt Access maNagement – SIFULAN[2], which aspires to become the ASEAN catch-all federation.

A workshop called TEIN Identity Management and Federation Workshop was successfully organised on 18-19 of January, 2014 at Institut Teknologi Bandung, Indonesia, where nearly all ASEAN countries participated.

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[2] http://www.sifulan.my/

11. CONCLUSIONS

The EGI-InSPIRE partners in the Asia Pacific region contributed to the development of the local individual distributed computing infrastructures within the context of regional collaborations taking place between the Resource Providers in the region and user communities across many countries. Collaborations between Europe and the Asia-Pacific region have continued with regular attendance at each other's major events, i.e., the EGI Forums, International Symposium on Grids and Clouds, and many other events established by different partners, and also through the daily contacts, interaction and support outside of these events. Collaborative applied research links continue to develop between researchers in Europe and the Asia Pacific region.

The partners in APGI have successfully attracted various user communities including High Energy Physics, Earth Science (earthquake & tsunami simulation, WRF simulation), Environmental Science, Biomedicine, Structural Biology, Computational Science & Engineering, Computational Chemistry, Humanities etc.

The ultimate goal of APGI is to foster a sustainable Asian e-Science infrastructure in order to support big data analysis. To do so, ASGC will continue providing both technical and user supports via APROC (Asia Pacific Regional Operation Centre) to the site administration and applications identified in the context of the EGI-InSPIRE project such as high energy physics, earthquake mitigation, climate change, drug discovery, computational chemistry etc.

User engagement activities will be strengthen in EGI-InSPIRE PY5 through the contribution of expertise to the Distributed Competence Centre. The plan is to strengthen this activities from 2015 with the participation to EGI follow-on project activities.