

## **WLCG**

The Worldwide LHC Computing Grid (WLCG) project is the first grid infrastructure developed for scientific applications. Using grid technology, it combines the computing resources of high-energy physics research institutes worldwide in supplying the needs of massive calculation, program designs, data management and system maintenance for Large Hadron Collider (LHC) experiments. Taiwan is the principal partner of the project in Asia. Supported by the National Science Council (NSC), institutions such as Academia Sinica's Institute of Physics and the Physics Departments of National Taiwan University and National Central University have joined the LHC experiments and play a significant role in envisaging research plans for the future. The Academia Sinica Grid Computing Centre (ASGC) is responsible for the technical implementation and is actively engaged in the global grid deployment and service.

The Large Hadron Collider (LHC), being built at the European Organization for Nuclear Research (CERN) in Switzerland, is the largest scientific instrument on the planet. The aim of the experiments is to understand the origin of the mass of fundamental particles, as to answer unsolved questions concerning the standard model of particle physics and to expand the knowledge on the origins of species and their patterns of evolution. The four LHC experiments (ATLAS, CMS, ALICE and LHCb) can help physicists discover fundamental particles and understand their properties through further analysis. The whole experiment scheme involves nearly 40 countries, including 179 research institutes and over 4,300 scientists.

The four LHC experiments will gather massive amounts of data of roughly 15 Petabytes (15 million Gigabytes) annually. The main task of the World-wide LHC Computing Grid (WLCG) is to build and maintain a worldwide grid infrastructure capable of matching the computing requirements of the LHC experiments. The objectives of WLCG include:

- Establishment and development of a grid infrastructure and computing services
- Establishment of a service mode suited for global grid use
- Development of grid-enabled tools for physics analysis and software applications
- Scheduling of maintenance, operation and expansion of the WLCG system

The massive amounts of data from the LHC experiments will be distributed and stored among the main participants around the world. In accordance with the three-tiered core model (Tier-0, Tier-1, Tier-2), the primary copy will be stored at CERN, the Tier-0 centre of WLCG. After initial processing, the data will be distributed to the eleven Tier-1 centers (including Academia Sinica in Taiwan), which have joined forces to form a global grid with around-the-clock availability, providing stable computing resources and data services on a long-term basis. The Tier-2 centers worldwide will provide resources and services to individual researchers and scientists for specific computing simulations and analyses.

## **Participation**

With the support of National Science Council, the Academia Sinica Grid Computing Centre (ASGC), Academia Sinica's Institute of Physics and the Physics Departments of National Taiwan University

and National Central University have proactively participated in LHC experiments since 2001 and deployed WLCG in Taiwan. ASGC has contributed to the establishment of the grid system, the strategy development, the training, and the promotion of WLCG. Over the years, ASGC has gained wide recognition from major grid development projects in Europe, the USA and Japan. Since 2006, Taiwan has served as the only Tier-1 Centre in Asia and became the Asia Pacific Core Infrastructure Centre as well as Regional Operations Centre (APCIC/ROC) upon the invitation by WLCG.

Through direct participation in the global e-Science infrastructure, ASGC intends to maintain a close collaborative relationship with leading international teams in order to further upgrade the capacities for supporting related domestic research.

At the same time, ASGC will actively promote the creation of a new domestic research infrastructure to allow for more large-scale basic research schemes and cross-border applications (such as earth science, atmospheric science and biological data, etc.). It will also continue to act as an effective communications hub for international collaborations.

#### Related links

-WLCG: <http://lcg.web.cern.ch/LCG/>

-LHC: <http://lhc.web.cern.ch/lhc/>

-CERN: <http://public.web.cern.ch/Public/Welcome.html>