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Nordic countries joint Grid computing facility starts to process data from the largest scientific experiment ever

DCSC teams up with Nordic sister organizations

The Danish Center for Scientific Computing (DCSC) is contributing significant High Performance Computing and Storage resources to the latest CERN experiment, dubbed *the greatest scientific experiment ever*, using the biggest machine ever built by mankind – The Large Hadron Collider (LHC). DCSC is the Danish partner in a joint Nordic partnership contribution, the so called Nordic DataGrid Facility (NDGF).

NDGF comprised of computing centers in Denmark, Finland, Norway and Sweden, started storing and processing data from the largest scientific experiment ever: the Large Hadron Collider (LHC) at CERN. NDGF is one of the key contributors to the scientific work at LHC, being one of the 11 major LHC data processing centers (known as Tier1). Together, these centers will have to manage live data arriving at a rate of 15 million Gigabyte every year, and process even larger amounts of derived and simulated data. NDGF share in this activity is 6%, which constitutes an unprecedented contribution from the Nordic scientific community.

The common effort of providing computing and storage resources to LHC is called Worldwide LHC Computing Grid (WLCG). It utilizes bleeding edge information technologies in order to bring together contributions from different countries. Grid technology is the basis of WLCG, and it is also the basis of NDGF: unlike other computing facilities, NDGF itself is a distributed effort that joins 9 computing centers in 4 Nordic countries. Thanks to such innovative Grid solutions as Advanced Resource Connector (ARC) and dCache, NDGF offers the highest efficiency and service levels. In addition to providing a WLCG Tier1, NDGF also supports 3 Nordic WLCG Tier2 centers, and cooperates with such facilities in other countries.

DCSC has its Tier2 center at the Niels Bohr Institute, Copenhagen University. DCSC, via NDGF, offers Grid computing services not only to WLCG, but also to a variety of other sciences, most notably, bioinformatics and environmental geoscience.

Brief

Large Hadron Collider

In September 2008, one of the most anticipated events of the decade took place: the Large Hadron Collider (LHC) at CERN started accelerating and colliding beams of particles. By all measures, LHC is the largest scientific experiment ever built. CERN is a European center for particle physics, but such a massive project required contributions from dozens of countries from all over the world. Physicists from all the continents strive to look at the data collected at LHC in order to understand the most fundamental question: what are the basic rules governing the Universe? Never before humankind was that close to ultimate understanding of basic principles of Nature.

LHC Computing and Grid

The answers sought by the LHC scientists are not going to be produced in an obvious manner. In collisions of protons, many other new objects will be created, and four massive detectors at LHC — ALICE, ATLAS, CMS and LHC-b — will be taking digital «snapshots» of such events. In order to discover a new object or a new phenomenon, these «snapshots» have to be analyzed by immense amount of computers. Previous accelerator experiments relied chiefly on mainframe computers situated near the experiments. With LHC, this is not feasible anymore. In order to amass the necessary computing and storage power, WLCG uses the Grid technology. In analogy to a power grid, where power plants provide consumers with electricity, in computing Grid, computing centers provide data storage and processing resources. There are different computing Grid solutions on the market. In Nordic countries, the most popular computing Grid solution is the Advanced Resource Connector (ARC) by NorduGrid. Distributed storage in NDGF is managed by dCache, which is a dedicated mass storage management software developed originally in accelerator labs in USA and Europe.