

DEPLOYING AN LCG-2 GRID INFRASTRUCTURE AT DESY*



A. Gellrich**, U. Ensslin, M. Ernst, P. Fuhrmann, M. Gasthuber, V. Gülzow, B. Lewendel, M. de Riese, DESY, Germany

DESY

DESY is one of the world-wide leading centers for research with **particle accelerators** and **synchrotron light**. The hadron-electron collider **HERA** houses 3 experiments which have been taking data for more than a decade and are planning to continue running until 2007.

DESY participates in the future linear collider project **ILC** very actively by developing the accelerator as well as studying possible detector designs.

DESY has recently decided to take part in the LHC experiments **ATLAS** and **CMS**.

DESY is member of the German/Switzerland (DECH) federation of **EGEE** and operates its Grid infrastructure in the context of the service area **SA1**. The work will continue in the second two years period of EGEE-II from April 2006 on.

DESY is founding partner of the German Grid initiative **D-GRID** and plays a leading role in the HEP community project as well as in the integration project.

[L. Schley: 90-A Computational and Data Scheduling Architecture for HEP Applications]



Grid Activities at DESY



DESY will operate an **LCG Tier-2** centre for ATLAS and CMS and is currently in the phase of setting up resources.

[M. Ernst: 180-Building a Federated Tier2 Center to support Physics Analysis and MC Production for multiple LHC Experiments]

The HERA experiments **H1** and **ZEUS** as well as the **ILC** group perform big parts of their *Monte Carlo* production on the Grid on various LCG sites world-wide.

[C. Wissing: 190-The LCG based mass production framework of the H1 Experiment]

[H. Städel: 324-The ZEUS Grid-Toolkit - an experiment independent layer to access Grid services]

For the LQCD community an International Lattice Data Grid (**ILDG**) is under construction which will enable groups around the world to exchange costly data sets which are produced on super computers. For the purpose dedicated catalogue services have been developed.

[D. Pleiter: 169-Using Grid Technologies for Lattice QCD]

DESY develops in collaboration with FermiLab the system **dCache** for storing and retrieving huge amounts of data, distributed over a large number of server nodes under a single virtual file system tree. dCache is used in Storage Elements as mass storage fabrics.

[P. Fuhrmann: 23-dCache, the Upgrade]

Grid Infrastructure at DESY

Set-up

The DESY Grid Infrastructure is based on the most recent **LCG-2** middleware, currently LCG-2_6_0. It contains all node types to make up a **complete** Grid.

Core services are Resource Brokers (**RB**), Information Index (**BDI**), Proxy Server (**PXY**), Catalog Services (**LFC & EDG**), Virtual Organizations Management (**VOMS**).

Resources are provided by the site Information Service (**GIIS**), Computing Elements (**CE**) with Worker Nodes (**WN**), and dCache-based Storage Elements (**SE**) as a back-end to the mass storage facilities.

Resources

Resources are published by a site-**GIIS**:

- grid-giis.desy.de:2170

DESY operates three **CEs**:

- 80 Intel **XEON** / 3.0 GHz [80kSI]
- 166 AMD **Opteron** / 2.4 GHz [240kSI]
- 34 Intel **Pentium-III** / 1 GHz [14kSI]

DESY operates two **SEs**:

- dCache-SE w/ 3 TB RAID (s/a)
- dCache-SE w/ 75 TB multi pool
- tape back-end 2 PB

DESY has a 1Gbit/s **WAN** connection.

VO Support

DESY **supports** the LHC VOs 'atlas' and 'cms'.

DESY **supports** the VO 'geant4'.

DESY **hosts** a number of **global** ('hone', 'ilc', 'zeus') **regional** ('baikal', 'calice', 'dcms', 'icecube', 'ildg'), and **local** VOs.

DESY provides all core services for its VOs.

For the LHC VOs ATLAS and CMS all requested **VO services** such as VOBOX, PHEDEX, FTS, etc., are or will be installed and operated.

Operational Experiences

The operation of a Grid infrastructure in a **global** context puts new demands to the institution in charge. Due to global dependencies, a new level of quality in providing services must be achieved. The following aspects must be considered:

Installation and configuration services for central administration of large farms.
[M. De Riese: 382-Embedding Quattor into the Fabric Management Infrastructure at DESY]

Monitoring and alarming services to operate services reliably (Ganglia / Nagios).

Redundancy for mission critical components by using fail-safe hardware.

Applying the Grid at DESY

Tier-2 @ DESY

DESY is setting up a **Tier-2** centre for LCG in **federation** w/ German universities for **ATLAS** (DESY & U Freiburg) and **CMS** (DESY & RWTH Aachen).

It is planned to ramp up the Grid resources at DESY from currently (320kSI2k / 75TB):

	2005	2006	2007	2008	2009
CPU [kSI2k]	200	800	1400	1600	1800
Disk [TB]	30	200	600	600	800
Tape [TB]	20	100	400	600	800

Service Challenges

DESY participated in the Service Challenges **SC3** (2005) and will continue in **SC4** (2006).

In **throughput tests** (GridFTP) DESY was able to saturate its WAN connection by transferring up to 100 MB/sec and averaging at 77MB/sec sustained. Data were written to a **dCache-SE**, exploiting a handful of pool nodes.

DESY participated in **CMS Grid-enabled Analysis** using CRAB and ran jobs successfully.

