


**eGee** 

# Grid Technology in Production at DESY

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**Overview**

- Introduction
- Grid Projects at DESY
- Grid Infrastructure at DESY
- DESY at the Grid
- Conclusions

<http://grid.desy.de/>

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## Introduction

- DESY is one of the world leading centers for research with **particle accelerators** and **synchrotron light**
- DESY operates the electron-hadron storage ring **HERA-II** with three running experiments (H1, HERMES, ZEUS) until 2007
- DESY is a **Tier-0/1** centre for the **HERA** experiments
- DESY has traditionally not been involved in CERN experiments and was therefore not automatically part of **LCG**
- DESY supports the Physics Institutes of the University of Hamburg in their **CMS** Grid activities
- A number of groups at DESY are currently considering the Grid



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## Grid @ DESY

- With the HERA-II luminosity upgrade, the demand for MC production rapidly increased while the outside collaborators moved there computing resources towards LCG
- The ILC group plans the usage of Grids for their computing needs
- The LQCD group develops a Data Grid to exchange data
- DESY considers a participation in LHC experiments
- ✓ EGEE and D-GRID
- ✓ dCache is a DESY / FNAL development
- ✓ Since spring 2004 an LCG-2 Grid infrastructure in operation




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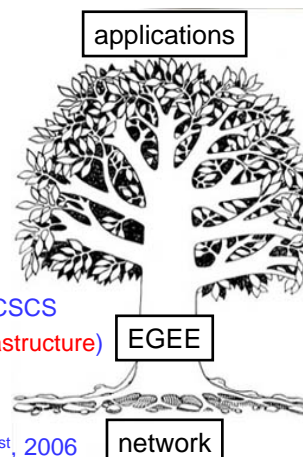
http://grid.desy.de/



## EGEE @ DESY

EGEE  
Enabling Grids for  
E-science in Europe

- Enabling Grids for E-Science
- EU 6th Framework Programme (FP 6)
- EGEE-1 started on April 1<sup>st</sup>, 2004
- 70 partners in 27 countries
- federated in 10 regional Grids
- Headquarter: CERN 
- DE/CH federation
- DESY, DKRZ, FhG-SCAI, FZK, GSI, CSCS
- DESY is in SA1 (operating a Grid infrastructure)
- DESY is funded with ~ 2FTEyears
- EGEE-2 will start for 2 years at April 1<sup>st</sup>, 2006
- <http://www.eu-egee.org/>





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## D-GRID @ DESY



- R&D programme for a **national German e-science infrastructure**
- DESY is founding member of the HGF institutes
- Organization in 6 communities
- Anticipated programme start is **mid/end 2005**, for 3 year
- Funding volume of 15 MEUR
- Currently pre-project phase
- A handful of community specific projects and 1 integration project
- DESY leads HEP Community Project (CP)
- DESY participates in the Integration project (IP), led by GridKa
- **DESY brings in know-how and experiences in data management**



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## ILDG @ DESY




- In **Lattice QCD** (LQCD) costly simulations so-called *configurations* performed on High Performance Clusters are the basis for research activities
- The **International Lattice DataGrid** (ILDG) was started with the aim of making gauge field *configurations* available to an international group of scientists using Grid technologies
- Each **configuration** submitted to ILDG will consist of a set of meta-data and a set of binary files
- In the context of the German **Lattice Forum** (LATFOR) DESY is setting up a Data Grid testbed, exploiting the common Grid infrastructure, in particular the catalogue services
- D. Pleiter: '**ILDG: DataGrids for Lattice QCD**' (ACAT 2005, Wed)



## LCG @ DESY



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- The institute for experimental physics of the **University of Hamburg**, located on the DESY site, joins **CMS** 
- DESY supports the institutes by providing computing infrastructure
- In cooperation with the **ATLAS** and **CMS** collaborators in Germany a **Tier-2** centre is considered at DESY
- The DESY Computer Centre offers the experience of decades of computing support for running HEP experiments
- DESY joins the *Service Challenges*



## dCache @ DESY ...



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- dCache provides data management software for DESY
- dCache is Grid-aware; it supports Grid protocols such as *srm* and *GridFTP*
- DESY's entire data space of 0.5 PB is managed via dCache
- dCache provides a Storage Element (SE) for the Grid
- This SE brings DESY's data to the Grid!
- <http://www.dcache.org/>



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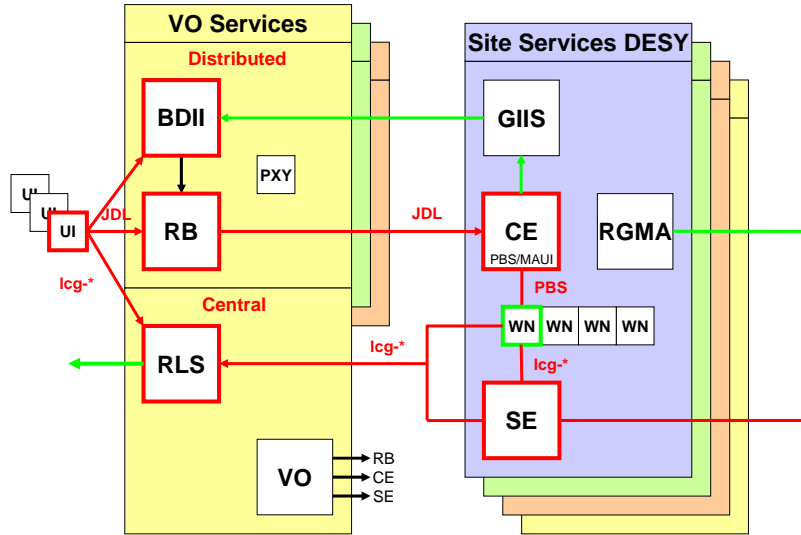


## Grid Infrastructure @ DESY ...

- DESY installed (SL 3.04, Quattor, yaim) and operates a complete independent Grid infrastructure which provides **generic** (non-experiment specific) **Grid services** to *all* experiments and groups
- The **DESY Production Grid** is based on LCG-2\_4\_0 and includes:
  - Resource Broker (RB), Information Index (BDII), Proxy (PXY)
  - Replica Location Services (RLS)
  - In total 24 + 17 WNs (48 + 34 = 82 CPUs)
  - dCache-based SE with access to the entire DESY data space
- **VO** management for the HERA experiments ('*hone*', '*herab*', '*hermes*', '*zeus*'), LQCD ('*ildg*'), ILC ('*ilc*', '*calice*'), Astro-particle Physics ('*baikal*', '*icecube*')
- **Certification** services for DESY users in cooperation with GridKa

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# ... Grid Infrastructure @ DESY ...

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- rack-mounted 1U servers
- dual Intel P4 XEON 2.8 GHz
- 2 GB ECC DDRAM
- GigaBit Ethernet
- 80 GB (E)IDE system disk
- 200 GB (E)IDE data disk
- 10 Gbit/s DESY back-bone
- 1 Gbit/s WAN (G-WIN)

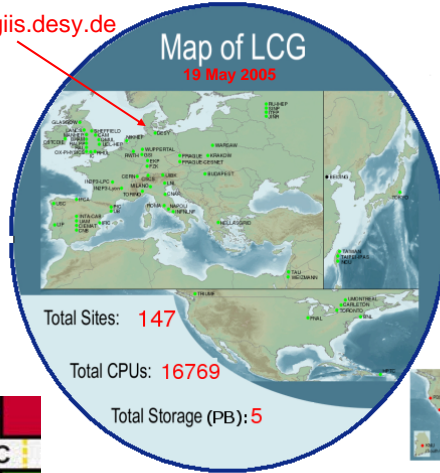




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## ... Grid Infrastructure @ DESY

[grid-giis.desy.de](http://grid-giis.desy.de)



Collaborating with LCG

NorduGrid



Grid3



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# DESY @ Grid ...



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- The **H1** experiment maintains the VO '*hone*'
- Sites: DESY, U Dortmund, RAL, Bham
- Developing a framework to bring MC production to the Grid
- The **ZEUS** experiment maintains the VO '*zeus*'
- Sites: DESY, INFN, UKI, U Toronto, UAM, Krakow, U Wisconsin
- The Grid Sites are currently being integrated in the **ZEUS Integrated MC Production system (ZIMP)** in addition to *funnel*
- ZIMP provides user request portals, book-keeping, statistics, and monitoring and plans for automated production services
- The **ILC** community maintains a VO '*ilc*'
- Sites: DESY, RHUL, QMUL
- First steps have just been gone

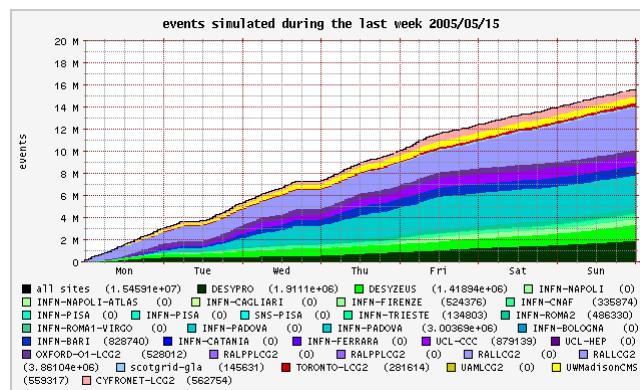


# ... DESY @ Grid ...



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- > 200 M events have been produced on the Grid since Nov 2004
- 2/3 produced outside DESY





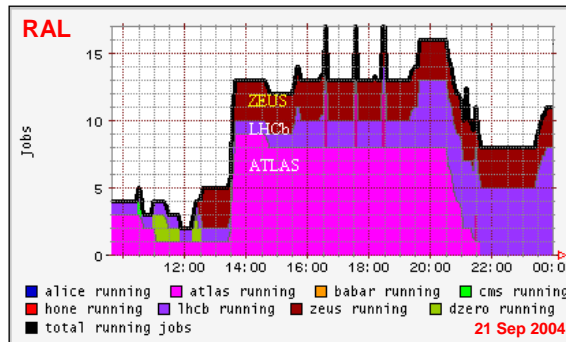
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## ... DESY @ Grid



- Many ZEUS collaborator sites joined LHC and moved there computing resources into the LCG



- H. Stadio: *'Monte Carlo Mass Production for the ZEUS experiment on the Grid'* (ACAT 2005, Wed)



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## Conclusions

- DESY maintains a Grid Infrastructure *in production*
- The Grid middleware LCG-2 is deployed; gLite comes next
- The *DESY Production Grid* includes all generic Grid services which are needed to make up a complete and independent Grid
- *One* common Grid infrastructure for *all* Grid activities at DESY
- For HERA experiments and major groups VOs exist
- H1 and ZEUS have proven the usability of the Grid for HEP
- H. Stadio: *'Monte Carlo Mass Production for the ZEUS experiment on the Grid'* (ACAT 2005, Wed)
- D. Pleiter: *'ILDG: DataGrids for Lattice QCD'* (ACAT 2005, Wed)
- In co-operation with the German collaborators the set-up of Tier-2 centers in Germany for ATLAS and CMS is being planned



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## Grid @ Web

- DESY Grid Web Sites:

- ✓ <http://grid.desy.de/>
- ✓ <http://www.dcache.org/>
- ✓ <http://www-zeus.desy.de/grid/>
- ✓ <http://www.lqcd.org/ildg/>

- Grid Computing Web Sites:

- > <http://www.globus.org/>
- > <http://www.eu-datagrid.org/>
- > <http://cern.ch/lcg/>
- > <http://www.eu-egee.org/>
- > <http://d-grid.de/>

