

ILC Grid at DESY



*<http://www.desy.de/~gellrich/>



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Contents

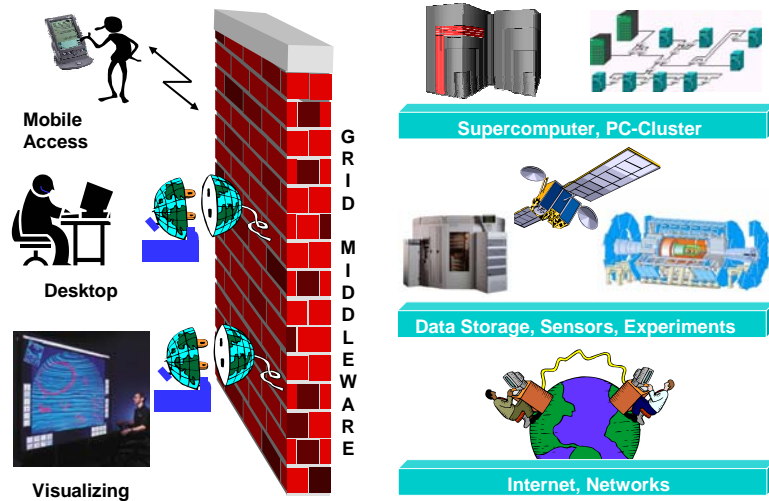
- Introduction
- Grid Projects at DESY
- Grid Infrastructure at DESY
- ILC Grid at DESY
- Conclusions

Aim of this talk is to *start* a discussion on Grid for ILC!



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The Grid Dream



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2



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Introduction

- DESY is one of the world-wide 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)
- DESY is a **Tier-0/1** centre for the **HERA** experiments
- DESY has traditionally not been involved in CERN experiments and is therefore not part of LHC / **LCG**
- DESY supports the Physics Institutes of the University of Hamburg in their **CMS** Grid activities
- DESY has identified Grid as a **strategic** technology for the future

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3



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Grid Projects at DESY



EGEE@DESY

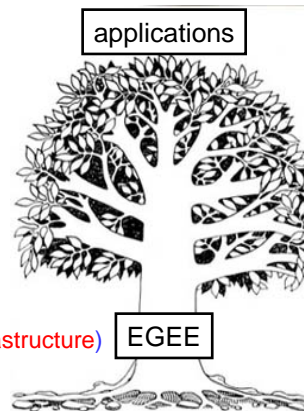


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- Enabling Grids for E-ScienceE
- EU 6th Framework Programme (FP 6)
- Started on April 1st, 2004
- 70 partners in 27 countries
- federated in 10 regional Grids
- Headquarter: CERN



- DESY is in D/CH federation
- DESY, DKRZ, FhG-SCAI, FZK, GSI
- DESY is in SA1 (operating a Grid infrastructure)
- DESY is funded with ~ 2FTEyears



- DESY provided resources for the GridKa School

- <http://www.eu-egee.org/>



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D-GRID@DESY



- R&D programme for a **national e-science infrastructure**
- DESY is founding member of the HGF institutes
- Organization in 6 communities
- Anticipated programme start is **January 1st, 2005**, for 3 year
- Funding volume of 20 MEUR
- Project proposal are due on **October 22nd, 2004**
- 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



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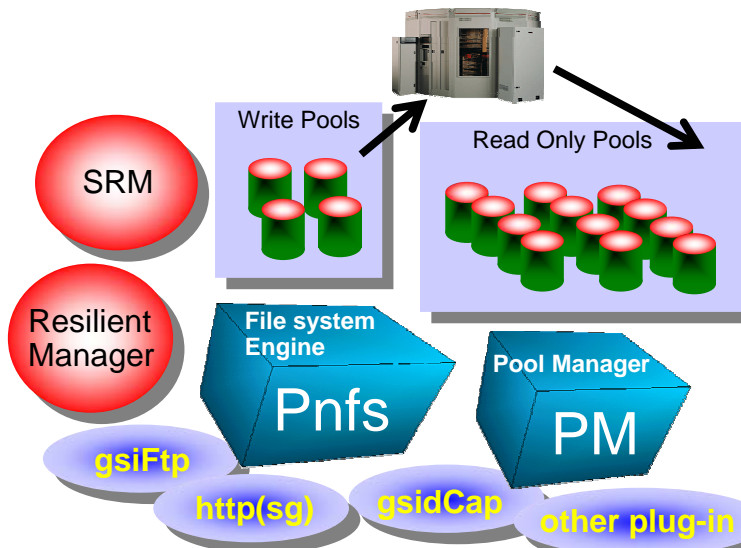
- Some physics institutes of the **University of Hamburg** are located on the DESY site
- DESY supports the institutes by providing computing infrastructure
- The Institute for Experimental Physics is partner of the **CMS** collaboration at LHC
- In a joint effort between DESY and the institute a Grid infrastructure to enable LCG on site will be installed
- Their Grid hardware is incorporated in the common DESY Grid infrastructure
- In cooperation with the University of Aachen a **CMS Tier-2** centre is planned in **Germany**



dCache@DESY ...



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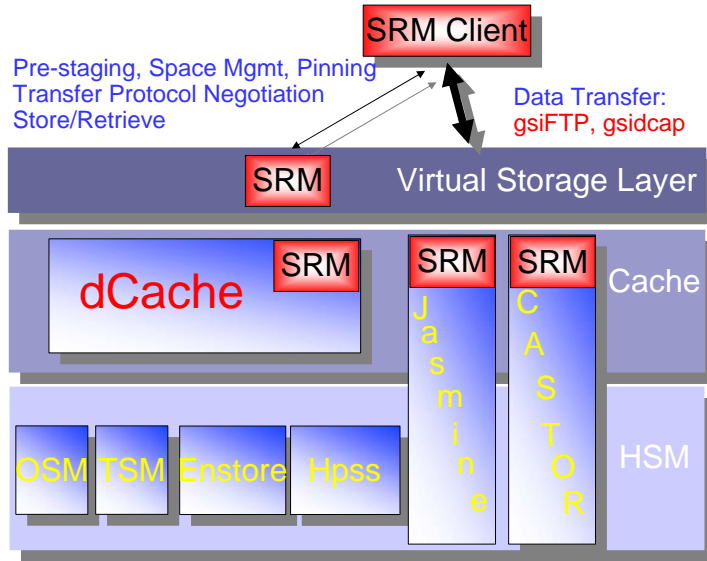




... dCache@DESY

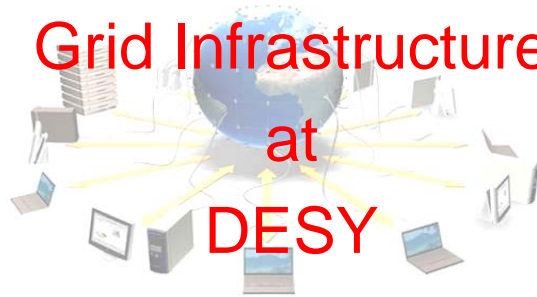


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Grid Infrastructure at DESY

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Grid Infrastructure at DESY

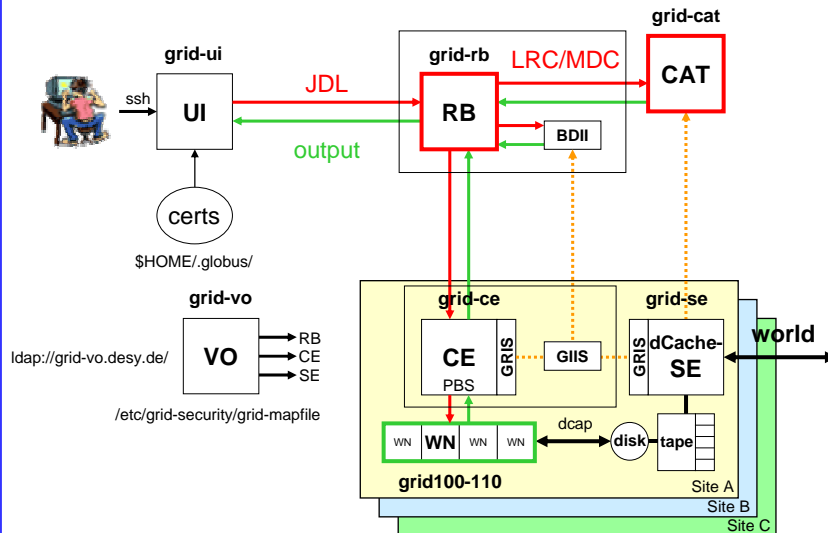
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- DESY installed and operates a complete and independent Grid infrastructure which provides **generic (non experiment specific) Grid services** to all experiments and groups a DESY
- The **DESY Production Grid** is based on LCG_2_2_0 and includes:
 - > Resource Broker (RB), Information Index (BDII), Proxy (PXY)
 - > Local Replica Catalog (LRC), Meta Data Catalog (MDC)
 - > 27 nodes, incl. 17 WNs (34 CPUs)
 - > dCache-based SE with access to the entire DESY data space of **0.5 PB**
- **Certification services** for DESY users in cooperation with GridKa
- **VO management** for the HERA experiments ('hone', 'herab', 'hermes', 'zeus'), LQCD ('ildg'), ILC ('ilc'), Astro-particle Physics ('baikal', 'icecube')



Grid Infrastructure at DESY: Grid Schema

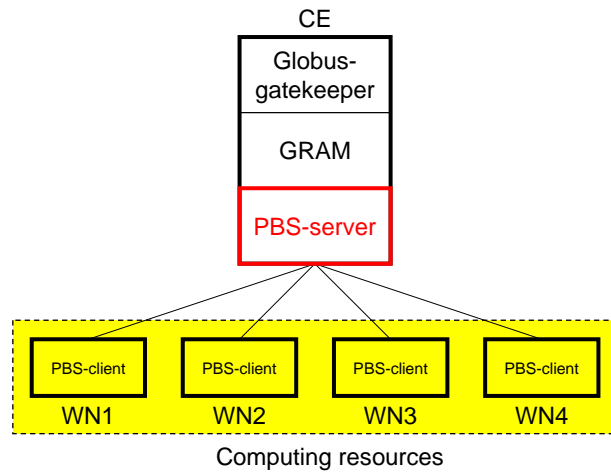
http://grid.desy.de/





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DESY Production Grid: Classical Set-up



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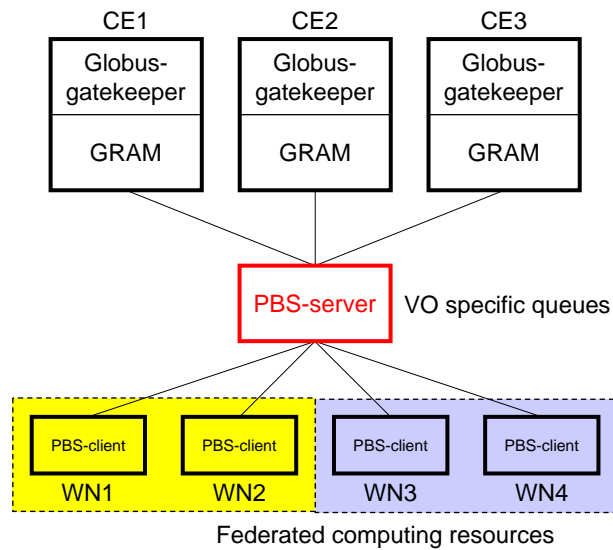
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14



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DESY Production Grid: Federating Resources



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15



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DESY Production Grid: **Hardware**



- rack-mounted 1U servers
- dual Intel P4 XEON 2.8 GHz
- 2 GB 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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16



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DESY Production Grid: **LCG-2**



The LHC Computing Grid, LCG, which was launched in September 2003 with 12 sites contributing, has been growing very rapidly. A snapshot of the 82 sites that were actively contributing to the LCG by August 04 is shown in the map above, which also provides a dynamic view of ongoing activity on the LCG. This map can be accessed at <http://goc.grid-support.ac.uk/lcg2> and was developed by the Grid Operations Centre based at the Rutherford Appleton Laboratory in Oxfordshire.

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17



DESY Production Grid: Experiences

- Security aspects:
 - > DESY uses sophisticated **firewall** settings
 - > Services are planned to run in a **DMZ** (partly already achieved for dCache services)
- Installation Experiences:
 - > Manual installation on **SuSE**-based DESY Linux clumsy
 - > **LCFGng**-based easier; RedHat 7.3 (gcc2.96)
 - > Waiting for common HEP Linux (**SL3**) and Quattor (?)
- Operational Experiences:
 - > **AFS** and **NIS/YP** on UIs highly welcomed by users
 - > **dCache**-based SE operational
 - > LDAP-based **globus-mds** lacks scalability
 - > **R-GMA** not yet considered





ILC@DESY: Requirements

- A Grid Infrastructure for management and hosting of the VO 'ilc':
 - ✓ *DESY Production Grid*
- Users with certificates:
 - ✓ FZ Karlsruhe (GridKa) issues certs on request (see web)
- Resources for production:
 - Additional farm nodes
- Participating sites:
 - U Freiburg
 - SLAC (Norman Graf)
- Applications:
 - Concepts



ILC@DESY: Status ...

```
> edg-job-list-match --vo ilc env.jdl
```

Selected Virtual Organisation name (from --vo option): **ilc**
Connecting to host grid-rb.desy.de, port 7772

COMPUTING ELEMENT IDs LIST

The following CE(s) matching your job requirements have been found:

CEId

```
grid-ce.desy.de:2119/jobmanager-lcgpbs-infinite
grid-ce.desy.de:2119/jobmanager-lcgpbs-long
grid-ce.desy.de:2119/jobmanager-lcgpbs-medium
ice1.ifh.de:2119/jobmanager-lcgpbs-infinite
ice1.ifh.de:2119/jobmanager-lcgpbs-long
ice1.ifh.de:2119/jobmanager-lcgpbs-short
uhh-ce.desy.de:2119/jobmanager-lcgpbs-infinite
uhh-ce.desy.de:2119/jobmanager-lcgpbs-long
uhh-ce.desy.de:2119/jobmanager-lcgpbs-medium
uhh-ce.desy.de:2119/jobmanager-lcgpbs-short
grid-ce.desy.de:2119/jobmanager-lcgpbs-short
*****
```



ILC@DESY: ... Status ...

> edg-rm --vo ilc pi

```

VO used           : ilc
default SE       : grid-se.desy.de
default CE       : grid-ce.desy.de
Info Service     : MDS
...

LRC endpoint     : http://grid-cat.desy.de:8080/ilc/edg-local-replica-catalog/services/edg-local-replica-catalog
RMC Endpoint     : http://grid-cat.desy.de:8080/ilc/edg-replica-metadata-catalog/services/edg-replica-metadata-catalog
ROS endpoint     :
...

CE grid-ce.desy.de:2119/jobmanager-lcgpbs-short

Name             : short
closeSEs        : grid-se.desy.de
VOs              : desy, zeus, hone, ilc, hermes, cms, baikal, ildg, dteam, icecube, ghep, herab
...

```

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ILC@DESY: ... Status

SE at desypro

```

name             : desypro
host             : grid-se.desy.de
type            : srm_v1
accesspoint     : /pnfs/desy.de/data
endpoint        : http://grid-se.desy.de:8443/srm/managerv1
VOs             : cms, gks, ilc, desy, ghep, hone, ildg, zeus, dteam, herab, baikal, hermes, icecube
VO dir for cms  : /pnfs/desy.de/data/cms
VO dir for gks  : /pnfs/desy.de/data/gks
VO dir for ilc  : /pnfs/desy.de/data/ilc
VO dir for desy : /pnfs/desy.de/data/desy
VO dir for ghep : /pnfs/desy.de/data/ghep
VO dir for hone : /pnfs/desy.de/data/hone
VO dir for ildg : /pnfs/desy.de/data/ildg
VO dir for zeus : /pnfs/desy.de/data/zeus
VO dir for dteam : /pnfs/desy.de/data/dteam
VO dir for herab : /pnfs/desy.de/data/herab
VO dir for baikal : /pnfs/desy.de/data/baikal
VO dir for hermes : /pnfs/desy.de/data/hermes
VO dir for icecube : /pnfs/desy.de/data/icecube
protocols       : gsidcap, gsiftp

```

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ILC@DESY: Next Steps

- Applications:
 - > Develop a concept for running jobs on the Grid
 - > Don't assume any ILC specific software installed
 - > Learn from H1 / ZEUS
 - > Think about a Grid-enabled framework
- Data management:
 - > A concept for *Replica* and *Meta Data Catalogue* is needed
 - > Consider developments for ILDG
- Resources:
 - > The current system is ready for tests
 - > For production computing resources must be included
 - > Data caching is done by means of dCache
 - > For mass storage the DESY's facilities are used



Conclusions

- DESY deploys a Grid Infrastructure, the *DESY Production Grid*
- The *DESY Production Grid* includes all generic Grid services which are needed to make up a complete independent Grid
- The deployed middleware is LCG-2 the current standard in European HEP computing
- The philosophy is to use *one* common Grid infrastructure for *all* Grid activities at DESY
- The *DESY Production Grid* prepared for a VO '*ilc*'
- For DESY, the Grid has become a *strategic* technology since we believe future experiments will expect the Grid as a tool



Web Links

- Grid Computing:
 - > <http://www.globus.org/>
 - > <http://www.eu-datagrid.org/>
 - > <http://cern.ch/lcg/>
 - > <http://www.eu-egee.org/>
 - > <http://d-grid.de/>
- DESY Grid Web Site:
 - ✓ <http://grid.desy.de/>
 - ✓ <http://www.dcache.org/>
- DESY Grid User Meeting (GUM):
 - ✓ <http://grid.desy.de/gum/> (bi-weekly, Fri 15.00h, SmRm 2k)
 - ✓ <mailto:grid-users@desy.de> (Mailing List)



Literature

- I. Foster, C. Kesselmann:
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Morgan Kaufmann Publisher Inc. (1999)
- F. Berman, G. Fox, T. Hey:
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John Wiley & Sons (2003)
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"What is the Grid? A Three Point Checklist" (2002)

