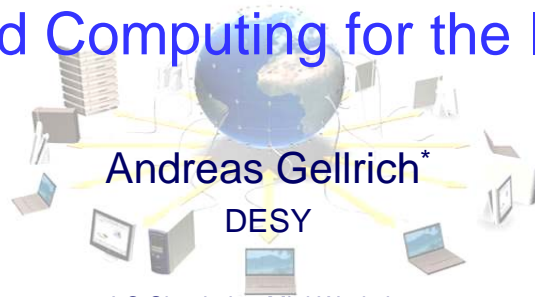


# Grid Computing for the ILC



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DESY

LC Simulation Mini Workshop

27/28 June 2005

DESY

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## Overview

Why is the Grid interesting for ILC?

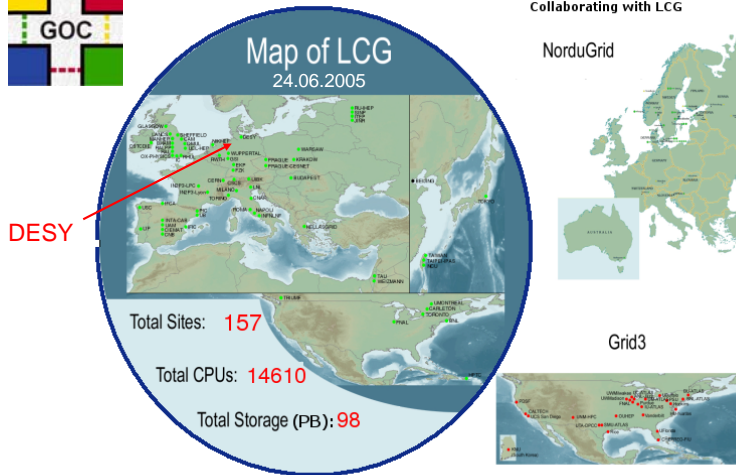
How can ILC benefit from the Grid?



EGEE



## The LCG Grid



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



EGEE

## Grid Computing

- The Grid is there – pioneered by LCG
- (Almost ) all HEP resources have been moved to the Grid
- Grid tools become the *de facto* standard for computing (local batch system globally accessible ) and data access (GridFTP, SRM, Replica Catalogs, Meta Data Catalogs)
- User management done within *Virtual Organizations* (VO)
- Certificates for authentication rather local site account
- Embedded in the EU project Enabling Grids for E-sciencE (EGEE)

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



EGEE

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

## Grid @ DESY

- With the **HERA-II** luminosity upgrade, the demand for MC production rapidly increased while the outside collaborators moved there computing resources into LCG
- **H1** and **ZEUS** maintain VOs and use the Grid for MC production
- The **LQCD** group develops a Data Grid to exchange data
- DESY is about to become an **LCG Tier-2** site
- ✓ **EGEE** and **D-GRID**
- ✓ **dCache** is a DESY / FNAL development
- ✓ Since spring 2004 an **LCG-2** Grid infrastructure in operation



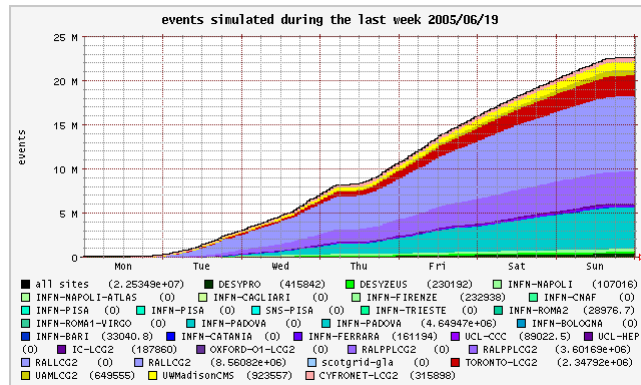
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## Grid Infrastructure ...

- VOs *hosted* at DESY:
  - Global: '**hone**', '**ilc**', '**zeus**' (registration via LCG registrar system)
  - Regional: '**calice**', '**dcms**', '**ildg**'
  - Local: '**baikal**', '**desy**', '**herab**', '**hermes**', '**icecube**'
- VOs *supported* at DESY:
  - Global: ('**atlas**'), '**cms**', '**dteam**'
  - Regional: '**dech**'
- H1 Experiment at HERA ('**hone**')
  - DESY, U Dortmund, RAL, RAL-PP, Bham
- ILC Community ('**ilc**', '**calice**')
  - DESY, RHUL, QMUL, IC, ...
- ZEUS Experiment at HERA ('**zeus**')
  - DESY, U Dortmund, INFN, UKI, UAM, U Toronto, Cracow, U Wisconsin, U Weizmann

- > 270 M events have been produced on the Grid since Nov 2004
- mainly produced outside DESY
- 32 sites (incl. Wisconsin and Toronto)



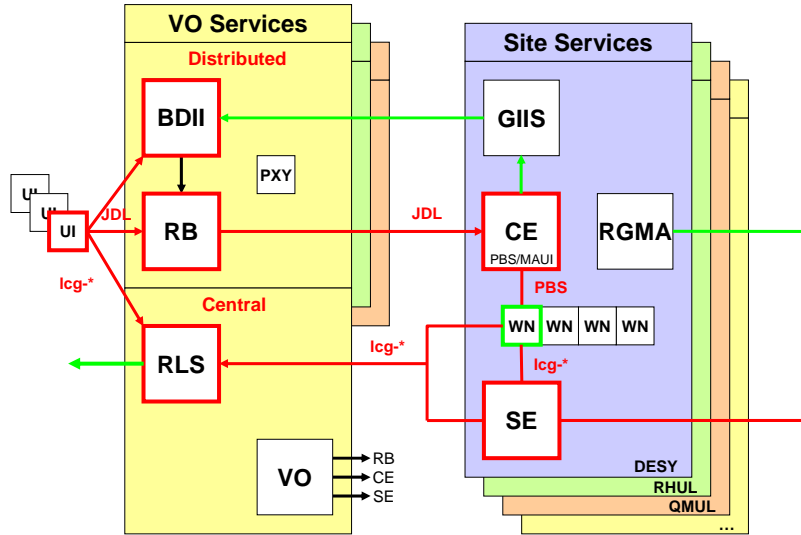
- SL 3.04
- Quattor (OS for all nodes; complete installation for WNs)
- Yaim (for all service nodes)
- LCG-2\_4\_0
- Central VO Services:
  - VO server (LDAP) [grid-vo.desy.de]
  - Replica Location Services (RLS) [grid-cat.desy.de]
- Distributed VO Services:
  - Resource Broker (RB) [grid-rb.desy.de]
  - Information Index (BDII) [grid-bdii.desy.de]
  - Proxy (PXY) [grid-pxy.desy.de]
- Site Services: [DESY-HH]
  - GIIS: ldap://grid-giis.desy.de:2170/mds-vo-name=DESY-HH,o=grid
  - CE: 24 WNs (48 CPUs, XEON 3.06 GHZ) (IT) [grid-ce.desy.de]
  - CE: 17 WNs (34 CPUs, XEON 1GHz) (ZEUS) [zeus-ce.desy.de]
  - SE: dCache-based with access to the entire DESY data space
  - Storage: disk 5 TB (+ 15 TB this summer), tape 0.5 PB media (2 PB capacity)



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http://grid.desy.de/

## ... Grid Infrastructure ...



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## ... Grid Infrastructure



- SuperMicro Superserver
- rack-mounted 1U servers
- dual Intel P4 XEON 2.8 / 3.06 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)
- 19 Worker Nodes (WN)
- 10 service nodes
- 3 WNs ZEUS
- 2 WNS U Hamburg
- 17 WNs ZEUS

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EGEE

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## ILC @ Grid

- The VOs 'ilc' and 'calice' are hosted at DESY since end of 2004
- Initial MC studies (Peter Wienemann, DESY / U Freiburg)
- *Registration* to 'ilc' is managed by LCG (<http://lcg-registrar.cern.ch>) and has become an *official* VO
- 'ilc' is currently supported by DESY, RHUL, QMUL
- 'calice' is supported by Imperial College (IC)
- The testbeam data of CALICE were moved between DESY and IC using Grid tools (GridFTP, SRM, RLS)



EGEE

http://grid.desy.de/

## Conclusions

- DESY maintains a Grid Infrastructure *in production* in the context of EGEE and D-GRID
- DESY is about to become an LCG *Tier-2* centre
- H1 and ZEUS heavily use the Grid for MC production
- VOs *already exist* for ILC and CALICE with international support
- Significant resources are available

**The Grid is ready for ILC!**



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

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

