

**eGee** **Grid Infrastructure for the ILC**

**DESY**

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DESY

*European ILC Software and Physics Meeting  
Cambridge, UK, 04.04.2006*

**The Grid Dream**

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

**Mobile Access**

**Desktop**

**Visualizing**

**GRID MIDDLEWARE**

**Supercomputer, PC-Cluster**

**Data Storage, Sensors, Experiments**

**Internet, Networks**

Andreas Gellrich, DESY ILC Meeting, Cambridge, 04.04.2006 1



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# Grid Computing

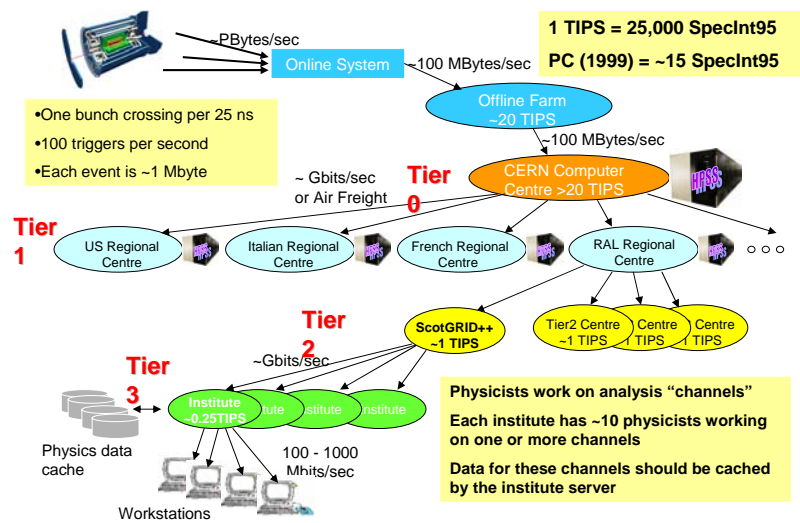
- Grid Computing is about *virtualization* of resources
- The Grid is there – pioneered by LCG
- (Almost ) all HEP resources have been moved to the Grid
- Grid tools become the *de facto* standard for computing (local batch system globally accessible ) and data access (GridFTP, SRM, Catalog Services)
- 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)



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# The LHC Computing Model





## Building Blocks



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- A *Virtual Organization (VO)* is a *dynamic collection of individuals, institutions, and resources* which is defined by certain sharing rules.
  - A VO represents a collaboration
  - Users are members of a certain VO (*Authorization*)
  - Users authenticate themselves with a certificate (*Authentication*)
  - Certificates are issued by a national *Certification Authority (CA)*
- Grid Infrastructure
  - Core Services (mandatory per VO)
    - VO Membership Services
    - Grid Information Services
    - Resources Brokers
  - Resources (brought in by partners) (*Grid sites*)



## Grid @ DESY ...



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- Grid activities were initially driven by the demand for resources for MC production of the **HERA** experiments **H1** and **ZEUS**
- The International Lattice Data Grid (**ILDG**) and the International Linear Collider Community (**ILC**) joined the Grid activities
- DESY participates in **EGEE** (since 2004) and **D-GRID** (since 2005)
- DESY sets up **LCG Tier-2** centers for **ATLAS** (in federation w/ U Freiburg) and **CMS** (in federation w/ RWTH Aachen)
- DESY participated in the Service Challenges **SC3** and prepares for **SC4** and the Pre-Production Service **PPS** for LHC
- DESY operates a complete Grid infrastructure incl. all services



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## ... Grid @ DESY ...

- Quattor (SL 3.05 for all nodes; complete installation for WNs)
- LCG-2\_6\_0 / LCG-2\_7\_0, Yaim (for all service nodes)
- Central VO Services: (*unique per VO*)
  - VO (LDAP) [grid-vo.desy.de]
  - VOMS [grid-voms.desy.de]
  - Catalogue Services: RLS / LFC [grid-cat2.desy.de]
- Distributed VO Services: (*mandatory per VO*)
  - Resource Broker (RB) [grid-rb.desy.de]
  - Information Index (BDII) [grid-bdii.desy.de]
  - Proxy (PXY) [grid-pxy.desy.de]



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## ... Grid @ DESY

- Site Resources:
  - GIIS: DESY-HH [grid-giis.desy.de]
  - CE: 83 \* XEON/2.8-3.06 GHz [grid-ce0.desy.de]
  - CE: 166 \* Opteron/2.4 GHz [t2-ce0.desy.de]
  - CE: 34 \* XEON/1GHz (ZEUS) [zeus-ce.desy.de]
  - SE: dCache-based w/ access to DESY data space of 0.5TB
- Grid (Tier-2) Resource Planning:
  - 2005: 200 kSpecINT2k 30 TB
  - Now: 350 kSpecINT2k 75 TB
  - 2006: 800 kSpecINT2k 200 TB
  - 2007: 1400 kSpecINT2k 600 TB
  - 2008: 1600 kSpecINT2k 600 TB
  - 2009: 1800 kSpecINT2k 800 TB



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## VO Support @ DESY

- 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: (Tier-2)
  - Global: 'atlas', 'cms', 'dteam'
  - Regional: 'dech'
- H1 Experiment at HERA ('hone')
  - desy, uni-dortmund, cscs, gridpp, bham, ucl, lances, ox, marseille, cyf-kr, saske
- ILC Community ('ilc', 'calice')
- ZEUS Experiment at HERA ('zeus')
  - desy, uni-dortmund, gridpp, bham, ucl, lances, ox, marseille, cyf-kr, saske, infn, utoronto, uam, scotgrid, weizmann, scai, bris, tau, ed



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## ILC @ Grid

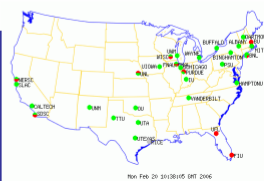
- The VOs 'ilc' and 'calice' are hosted at DESY w/ all core services
- *Registration* to 'ilc' is managed by LCG (<http://lcg-registrar.cern.ch>) and has become a so-called *global* VO in EGEE
- 'ilc' is currently supported by ~10 UKI sites, LAL, Freiburg, DESY (27 CEs, 3500 CPUs, 42 TB, 6 RBs)
- Data have been moved to SLAC with Grid tools
- 'calice' is supported by DESY and Imperial College (IC)
- The testbeam data of CALICE were moved between DESY and IC using Grid tools (GridFTP, SRM, LFC)

# GOC Grid Monitoring

Grid Projects Collaborating in LHC Computing Grid

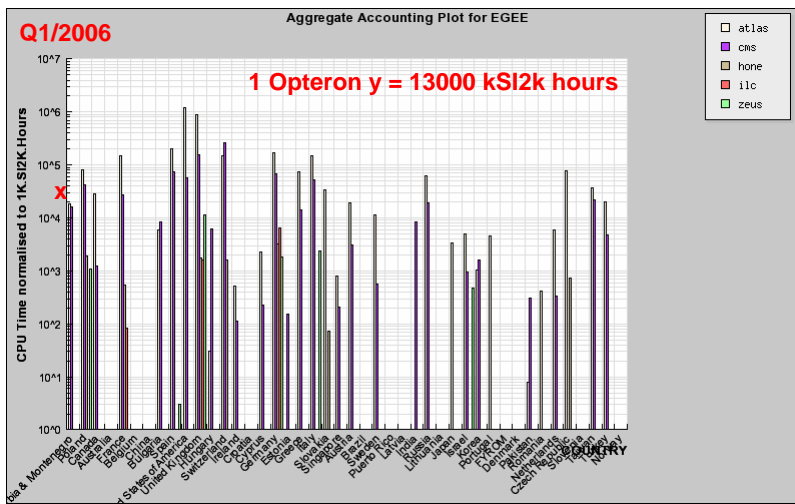


EGEE Operations Information	
Active Sites	188
Available CPU	35676
Available Storage (TB)	3411
2006-03-31	

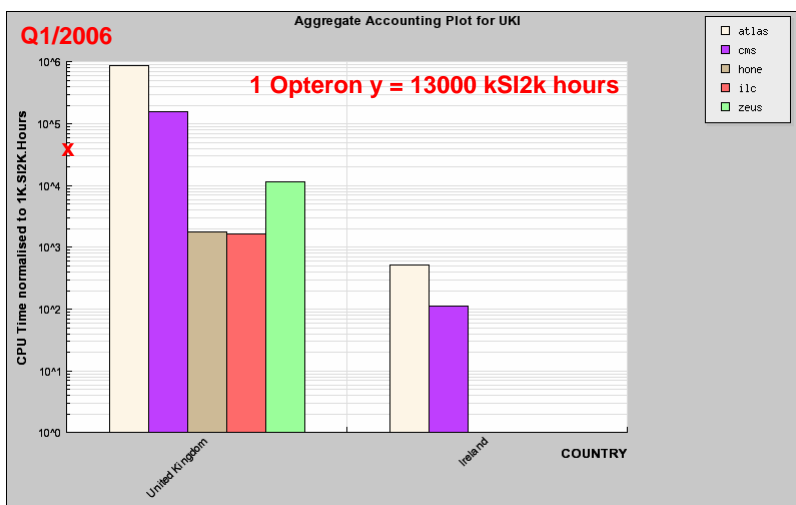
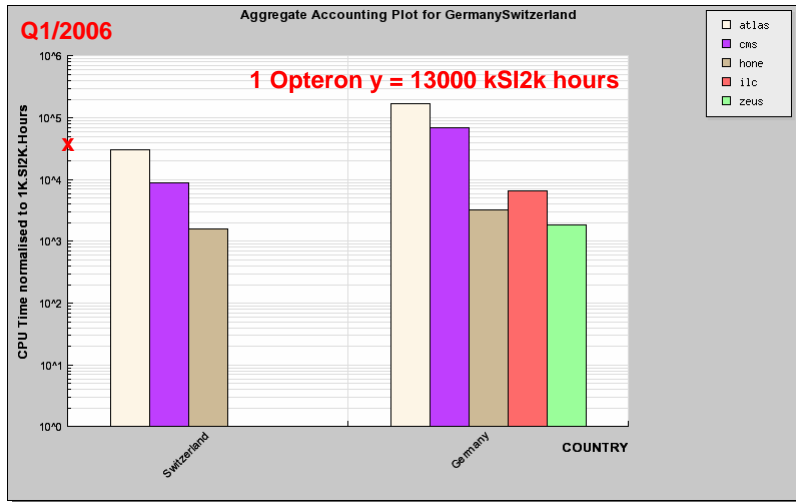


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# EGEE Accounting ...



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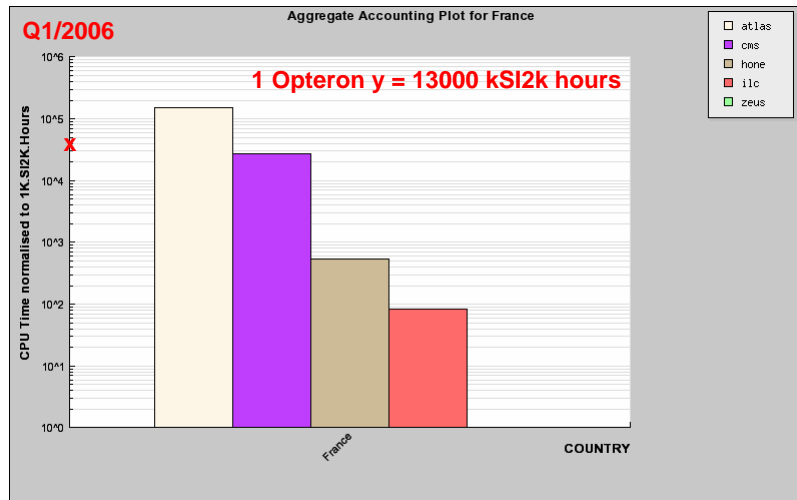


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## ... EGEE Accounting

eggee Enabling Grids for E-science



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## Future Aspects

- The Grid infrastructure will move to gLite middleware
  - Client commands might slightly change
- Scientific Linux 4 is coming (pushed by the LHC experiments)
  - Software must run on SL4 WNs
- Multiple VO membership has been a hot topic
  - VOMS is being rolled-out
- Database access by many concurrent jobs
  - Caching technologies are under development
- Continue to use resources parasitically?





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## Conclusions

- Grid Computing is a **strategic** technology for the future
- (Significant) **resources** will be available in the Grid (only)
- The Grid requires **global** thinking
- DESY maintains a Grid Infrastructure **in production**
- DESY is an LCG **Tier-2** centre for **ATLAS** and **CMS**
- **H1**, **ILC**, and **ZEUS** heavily use the Grid for **MC** production
- Service Challenges **SC3/SC4**
- **VOs** *already exist* for **ILC** and **CALICE** with international support



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## At Last

The Grid is ready for ILC!

Get your certificate quick  
and  
start to use the Grid!



# Grid @ Web

- DESY Grid Web Sites:

- ✓ <http://grid.desy.de/>
- ✓ <http://grid.desy.de/certs/>
- ✓ <http://grid.desy.de/users/>
- ✓ <http://grid.desy.de/install/DESY-VO.html>

- Grid Computing Web Sites:

- > <http://cic.in2p3.fr/>
- > <http://cern.ch/lcg/>
- > <http://www.eu-egee.org/>



# Grid Infrastructure

