Grid Computing

- An Introduction -

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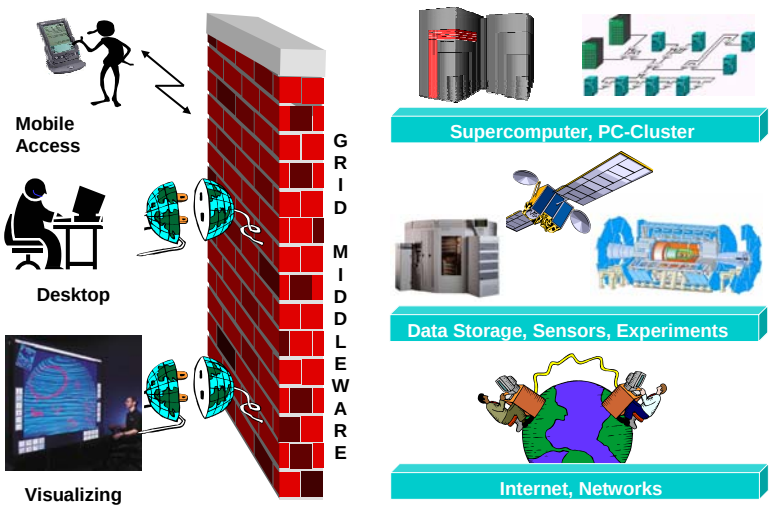
http://grid.desy.de/

This Talk

- What is the idea of the Grid
- How is this idea realized
- What about ILC on the Grid
- Summary

The Grid Dream



The Grid Idea

„A computational grid is a hardware and software infrastructure that provides dependable, consistent, pervasive, and inexpensive access to high-end computational capabilities.“ I. Foster, C. Kesselmann (1998)

„The sharing that we are concerned with is not primarily file exchange but rather direct access to computers, software, data, and other resources, as is required by a range of collaborative problem-solving and resource brokering strategies emerging in industry, science, and engineering. The sharing is, necessarily, highly controlled, with resources providers and consumers defining clearly and carefully just what is shared, who is allowed to share, and the conditions under which sharing occurs. A set of individuals and/or institutions defined by such sharing rules what we call a virtual organization.“ I. Foster, C. Kesselmann, S. Tuecke (2000)

The Grid Definition

I. Foster: *What is the Grid? A Three Point Checklist* (2002)

A Grid is a system that:

✓ *coordinates resources which are not subject to centralized controls*

integration and coordination of resources and users of different domains *versus* local management systems (batch systems)

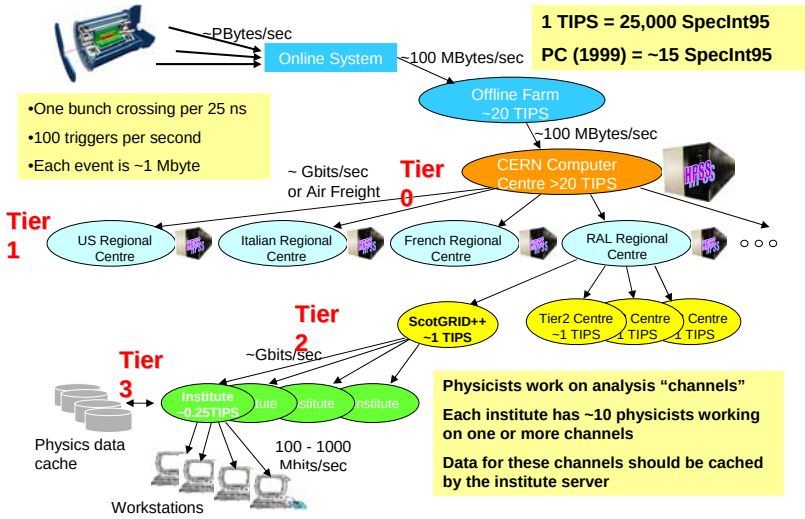
✓ *uses standard, open, general-purpose protocols and interfaces*

standard and open multi-purpose protocols *versus* application specific system

✓ *delivers nontrivial qualities of services*

coordinated use of resources *versus* uncoordinated approach (world wide web)

The LHC Computing Model



The *Fuzz* about Grids

http://grid.desy.de/









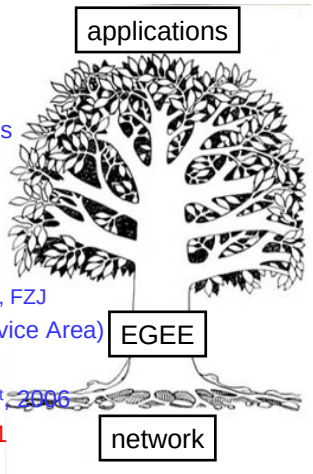



EGEE @ DESY

http://grid.desy.de/

- Enabling Grids for E-SciencE
- EU 6th Framework Programme (FP 6)
- EGEE-I started on April 1st, 2004
- 70 partners, 27 countries,10 federations
- Coordinator: CERN
- Volume: 32 MEUR

- DE/CH federation:
  DESY, DKRZ, FhG-SCAI, FZK, GSI, CSCS, FZJ
- DESY is funded w/ 1 FTE in SA1 (Service Area)
- EGEE-II will start for 2 years at April 1st, 2006
- DESY will be funded w/ 1.5 FTE in SA1
- http://www.eu-egee.org/



D-GRID @ DESY

http://grid.desy.de/

- 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 fall 2005, for 3 year
- Funding volume of 15 MEUR
- Currently pre-project phase

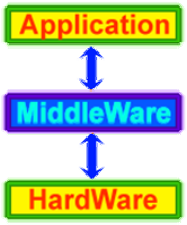
- A handful of community specific projects and 1 integration project

- 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

Building Blocks

http://grid.desy.de/

- 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 Services

http://grid.desy.de/

- Quattor (SL 3.05 for all nodes; complete installation for WNs)
- LCG-2_6_0, Yaim (for all service nodes)

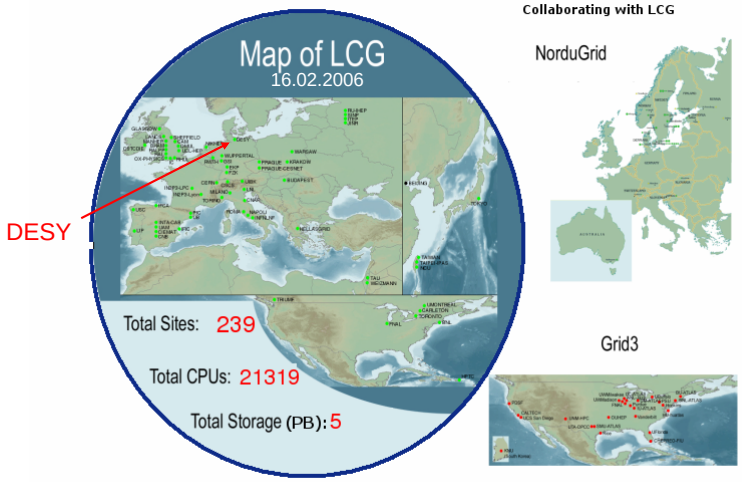
- Central VO Services: (*unique per VO*)
  - VO server (LDAP) [grid-vo.desy.de]
  - VOMS [grid-voms.desy.de]
  - Catalogue Services: RLS / LFC [grid-cat/2.desy.de]

- Distributed VO Services: (*mandatory per VO*)
  - Resource Broker (RB) [grid-rb0/2.desy.de]
  - Information Index (BDII) [grid-bdii.desy.de]
  - Proxy (PXY) [grid-pxy.desy.de]

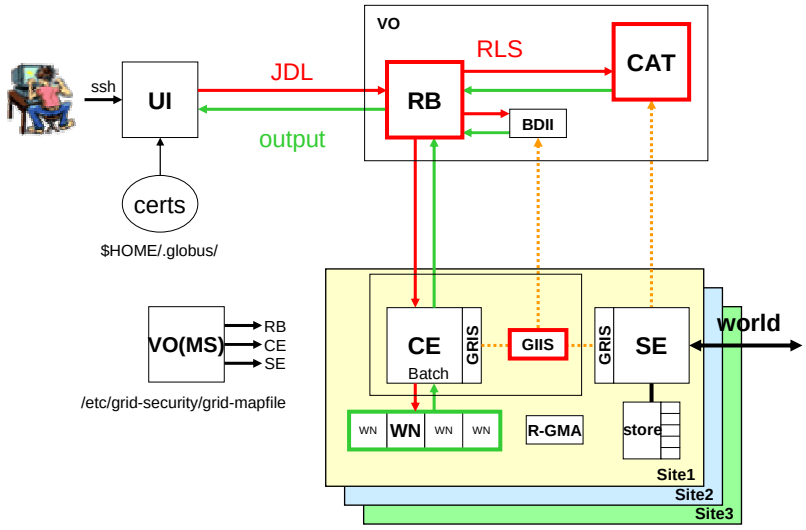
- Site Services: (*multiple*)
  - GIIS: ldap://grid-giis.desy.de:2170/mds-vo-name=DESY-HH,o=grid
  - CE: 82 * XEON/3.06 GHz [grid-ce0.desy.de]
  - CE: 166 * Opteron/2.4 GHz [t2-ce0.desy.de]
  - CE: 34 * XEON/1GHz (ZEUS) [zeus-ce.desy.de]
  - SE: 75 GB; dCache-based with access to the entire DESY data space

GOC Grid Monitoring

http://grid.desy.de/



Grid Infrastructure



DESY VOs

- 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, lancs, ox, marseille, cyf-kr, saske
- ILC Community ('*ilc*', 'calice')
  - desy, uni-freiburg, bham, ox, ral, ic, qmul, lal, ed
  - contact to SLAC and FermiLab
- ZEUS Experiment at HERA ('*zeus*')
  - desy, uni-dortmund, gridpp, bham, ucl, lancs, ox, marseille, cyf-kr, saske, infn, utoronto, uam, scotgrid, weizmann, scai, bris, tau, ed

Summary

- Grid Computing is a strategic technology
- LHC relies on it
- LHC/EGEE will bring the Grid forward
- Computing resources will be only in the Grid
- Grid Infrastructure is in place (SC3/4)
- VOs '*ilc*' and '*calice*' have been founded

Grid @ Web

- DESY Grid Web Sites:
  - ✓ http://grid.desy.de/
  - ✓ http://grid.desy.de/certs/
  - ✓ http://grid.desy.de/users/
- Grid Computing Web Sites:
  - ➢ http://cern.ch/lcg/
  - ➢ http://www.eu-egee.org/
  - ➢ http://d-grid.de/

At Last

http://grid.desy.de/

Get your certificate quick
and
start to use the Grid!