




eGee **Grid Computing:** 

Current and Future Developments

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Introduction ...

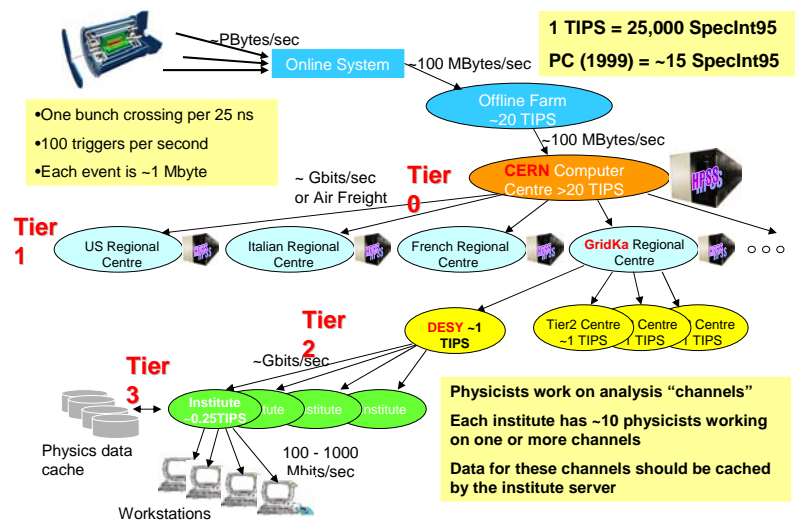
- ILC is on the Grid ...
- ... now it is time to polish things ...
- ... and add some more understanding.
- [ILC includes the VOs 'calice' and 'ilc']
- Today:
 - Introduction
 - Authorization (multiple VO membership, VOMS)
 - Data access (global, local)
 - VO support
 - Open issues
 - Practical advises
 - Some numbers

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... Introduction

- ILC is supported by a lot of sites world-wide, mainly Tier-2 sites
- Grid infrastructure is used parasitically, e.g. LCG
- DESY hosts the VOs 'calice' and 'ilc' in it Grid infrastructure which is also used for the HERA experiments as a Tier-2
- A strong commitment to ILC exists
- Sites dedicate resource *shares* to ILC
- Supporting sites are:
 - desy, ifh, freiburg
 - France (lal, lyon, ecole polytechnique (LLR), saclay)
 - fnal
 - ral, brunel, ic, cam, ox, bham, ucl, manchester, ed, lesc, qmul, rhul, gla
 - tau
 - kek

The LHC Computing Model





Authorization ...

- *Authentication* is done by way of individual user certificates which are issued by *Certification Authority* (CA)
- *Authorization* is done in the context of a *Virtual Organization* (VO)
- DESY operates *Virtual Organization Membership Service* (VOMS) for the 2 VOs: 'calice' and 'ilc'
- Users can be members of more than one VO, e.g. 'atlas' and 'ilc'
- Registration (Grid user cert is needed!):
 - <https://grid-voms.desy.de:8443/voms/calice>
 - <https://grid-voms.desy.de:8443/voms/ilc>



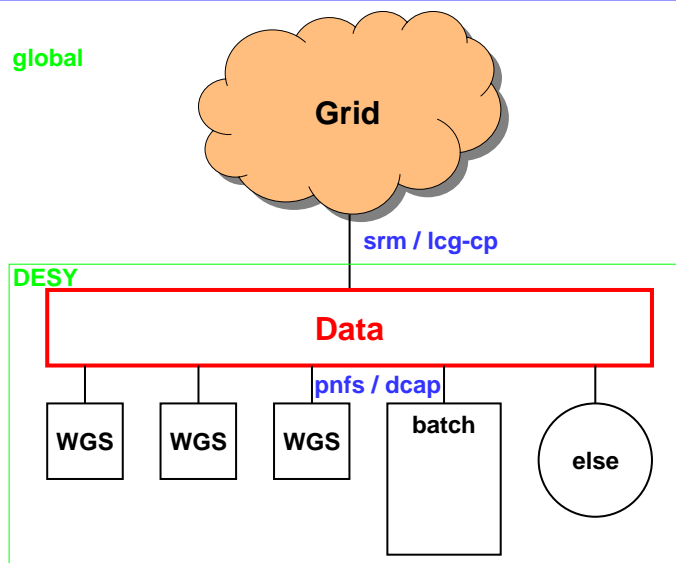
... Authorization

- VOMS-proxies contain extension w/ VO membership:
 - > `voms-proxy-init -debug -voms ilc:/ilc`
- The CEs are ready for VOMS proxies
- Mapping is done the appropriate queues
- dCache SEs will be aware of VOMS proxies soon
- Open issue:
 - Make 'calice' a group of 'ilc' to have only one
 - > `voms-proxy-init -debug -voms ilc:/ilc/calice`
- There are wishes to use VOMRS for users registration ...

Data Access ...

- The *computing* part (providing and using CPU cycles for jobs) is the easy part of the Grid.
Jobs are *volatile*.
 They come and go - even when they crash – and might go to another site instead.
 There is almost no integrity problem.
- The Grid's main challenge is the *storage* of data.
Data are *persistent* and *referenced*.
 They remain in the storage system and are known to the file catalogue upon deletion (the latter even when the storage system fails). There is an integrity problem!

... Data Access ...





... Data Access

- DESY supports a repository for ILC data
- DESY maintains a tape back-end to which data files can be automatically copied
- The main *Storage Element (SE)* is 'srm-dcache.desy.de'
- However, dealing with large data sets is not trivial!
The default directory path which is selected when copy-and registering files is disk-only, though safe
- Contact us to arrange for more ...



VO Support ...

- EGEE provides the *Global Grid User Support (GGUS)* portal for all global EGEE VOs, e.g. 'ilc':
 - <https://gus.fzk.de/>
 - An sophisticated support structure exists
 - ROC-on-duty service
 - Problems are routed to the affected sites
 - Might take some time
- In addition, mailing lists (ML) are hosted by DESY:
 - calice-vo-support@desy.de
 - calice-vo-users@desy.de
 - ilc-vo-support@desy.de
 - ilc-vo-users@desy.de



... VO Support

- Do we need more?
 - Coordinated development of scripts and tools?
 - Designated support on user level?
 - Central MC production?
- Some announcements and discussions hit the VO users ML
- We think about asking people by way of a questionnaire what the miss?
- Is this needed? What do you think?
- In any case, report problems!



Open Issues

- **Stability** of the middleware components / services
- **Performance** of the job submission; turn-around times
- The Grid is about to move to SL4 (though SL5 is out already) ...
- ... but not yet done
- SL3 support will stop this year ...
- As we learned, usually SL3 executables run on SL4 WNs
- Be aware!

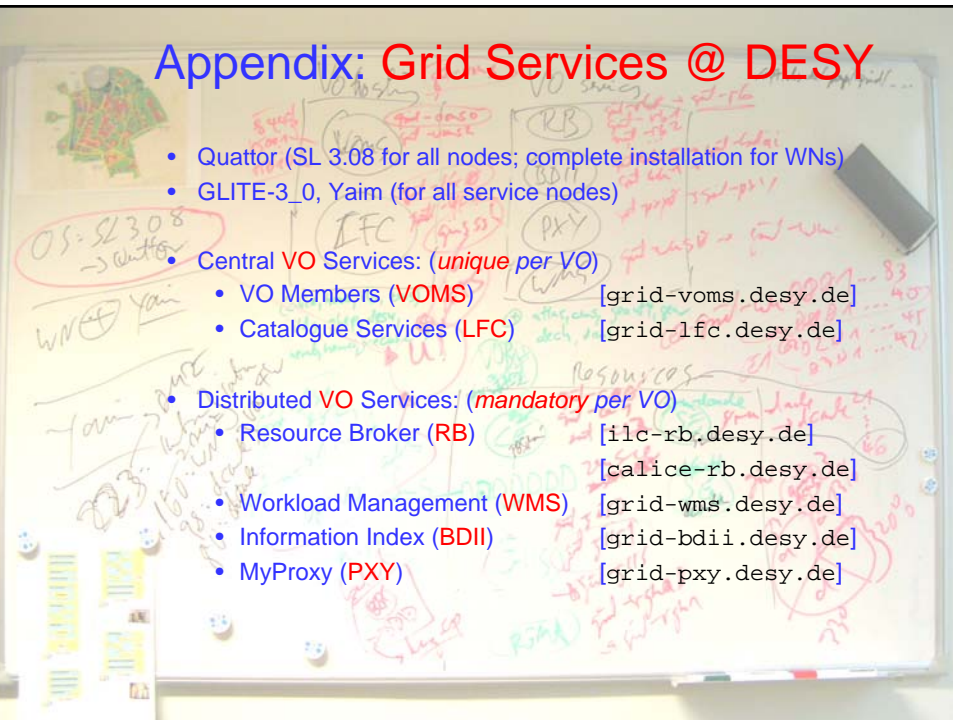
Practical Advises

- Find out about resources via:
 - > lcg-infosites -vo ilc all
 - > lcg-infosites -vo ilc rb
 - > lcg-infosites -vo ilc ce
 - > lcg-infosites -vo ilc se
 - > lcg-infosites -vo ilc lfc

- We maintain dedicated *Resource Brokers (RB)* via aliases:
 - ilc-rb.desy.de
 - calice-rb.desy.de

- The catalogue is:
 - grid-lfc.desy.de

Appendix: Grid Services @ DESY

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- Quattor (SL 3.08 for all nodes; complete installation for WNs)
 - GLITE-3_0, Yaim (for all service nodes)
 - **Central VO Services: (unique per VO)**
 - VO Members (VOMS) [grid-voms.desy.de]
 - Catalogue Services (LFC) [grid-lfc.desy.de]
 - **Distributed VO Services: (mandatory per VO)**
 - Resource Broker (RB) [ilc-rb.desy.de]
[calice-rb.desy.de]
 - Workload Management (WMS) [grid-wms.desy.de]
 - Information Index (BDII) [grid-bdii.desy.de]
 - MyProxy (PXY) [grid-pxy.desy.de]



Appendix: Grid Resources @ DESY

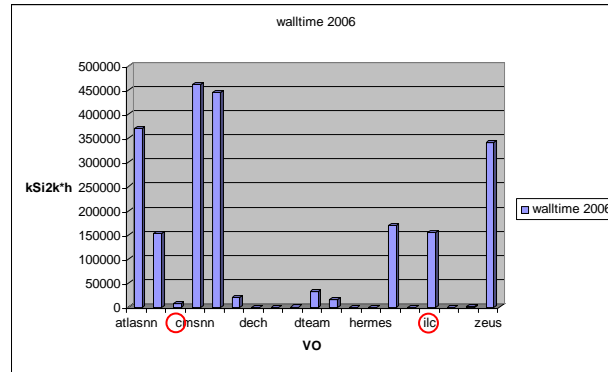
- Site Resources:
 - **GIIS:** DESY-HH [grid-giis.desy.de]
 - **CE:** 166*Opteron/2.4GHz [grid-ce0.desy.de]
 - **CE:** 324*Opteron/2.2 Woodcrest/3.0GHz [grid-ce1.desy.de]
 - **CE:** 90*XEON/3.0GHz [grid-ce2.desy.de]
 - **SE:** dCache-based w/ access to DESY data space incl. tape
- Grid (Tier-2) Resource Planning
 - **Now:** 850 kSpecINT2k (200) TB
 - 2008: 1600 kSpecINT2k 600 TB
 - 2009: 1800 kSpecINT2k 800 TB



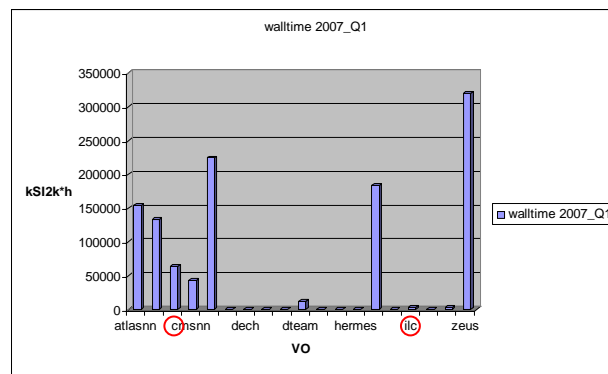
Appendix: VOs @ DESY

- VOs hosted at DESY:
 - Global: '*hone*', '*ilc*', '*zeus*'
 - Regional: '*calice*', '*ildg*'
 - Local: '*baikal*', '*desy*', '*herab*', '*hermes*', '*icecube*'
- VOs supported at DESY:
 - Global: '*atlas*', '*cms*', '*dteam*'
 - Regional: '*dech*'
- H1 Experiment at HERA ('*hone*') (<http://grid-voms.desy.de:8443/vomses/>)
- ILC Community ('*ilc*', '*calice*') (<http://grid-voms.desy.de:8443/vomses/>)
- ZEUS Experiment at HERA ('*zeus*') (<http://grid-voms.desy.de:8443/vomses/>)

Appendix: Usage @ DESY ...



Appendix: ... Usage @ DESY ...





Appendix: ... Usage @ DESY

- Storage:
 - 'calice':
 - Disk Grid: 41 GB
 - Tape:
 - tb-cern: 9.7 TB
 - tb-desy: 4.2 TB
 - 'ilc':
 - Disk Grid: 1.2 TB
 - Tape: 94 GB



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 generic 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
- Note: Non-HEP Grid applications gain significance



Appendix: The Grid on the Web

- The Grid on the web at DESY:
 - ✓ <http://grid.desy.de/>
- German Grid Initiative:
 - <https://www.d-grid.de/>
- LCG and EGEE:
 - <http://cern.ch/lcg/>
 - <http://www.eu-egee.org/>
 - <http://cic.in2p3.fr/>