Grid Computing at DESY

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HELMHOLTZ ASSOCIATION

DESY

Introduction: Contents

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Introduction: History of the DESY Grid Centre

- DESY has a long tradition in HEP computing (serving experiments on site)

- 2003: First look into Grid computing
- 2003: Future key technology to access resources
- 2004: LCG_2-1 Grid infrastructure H1 and ZEUS, IceCube, ILC, ILDG
- 2004: EU-Project EGEE(2/3) / DECH
- 2004: Tier-2 for ATLAS, CMS, LHCb
- 2005: Foundation of national D-Grid (DGI(2) and HEPCG)
- 2007: National Analysis Facility (NAF) (ATLAS, CMS, LHCb, ILC)
- 2010: Start of EGI / NGI_DE and EMI (dCache)
- 2011: world-wide biggest Tier-2 center for CMS
- 2012: VO '*belle*' added

DESY Grid Center: Grid + NAF

- The Grid infrastructure reflects DESY's manifold scientific programme:
  - DESY is the *home* of 10 VOs (6 global), incl. non-HEP
  - (WLCG-)Tier-2 for ATLAS, CMS, and LHCb in Germany (Tier-1: GridKa)
  - Tier-0/1 for HERA; ILC VOs incl. testbeams (DESY, FNAL, CERN); CTA
  - Tape back-end for non-Tier-2

- One *complete generic* Grid infrastructure for *all* VOs
  - *Federated* resources w/ *opportunistic* usage ("*everybody profits*")
  - Flexible and scalable to support new VOs
  - Currently, roughly 2/3 of the resources are currently used by the Tier-2 VOs

- Grid is *complemented* by the National Analysis Facility (NAF) [size: ~1 Tier-2]

DESY Grid Center: Set-up

- Two DESY Grid sites:
  - **DESY-HH** `ldap://grid-giis.desy.de:2170/mds-vo-name=DESY-HH,o=grid`
  - **DESY-ZN** `ldap://lcg-giis.ifh.de:2170/mds-vo-name=DESY-ZN,o=grid`
- VOs at DESY-HH:
  - DESY: '*calice*'/'*ilc*' '*hermes*'/'*hone*'/'*zeus*' '*icecube*' '*ildg*' '*xfel.eu*'
  - Tier-2: '*atlas*' '*cms*'
  - HEP: '*belle*'
  - non-HEP: '*biomed*' '*enmr.eu*'
  - Operations: '*dech*' '*desy*' '*dgops*' '*dteam*' '*ghep*' '*ops*'
- Grid Core Services:
  - CREAM-CE, VOMS, top-level BDII, 6 WMS, LB, LFC, PX
  - Load balancing via DNS aliases for BDIIs, WMS'
  - VODIRs on NFS; testing CVMFS
- Network:
  - LHCone: dedicated connection between (big) sites (GridKa, CERN)

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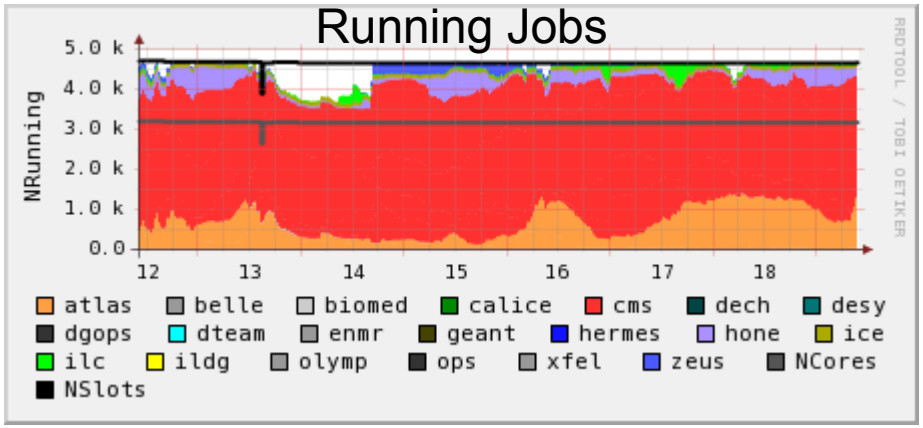
DESY Grid Center: Resources at DESY-HH

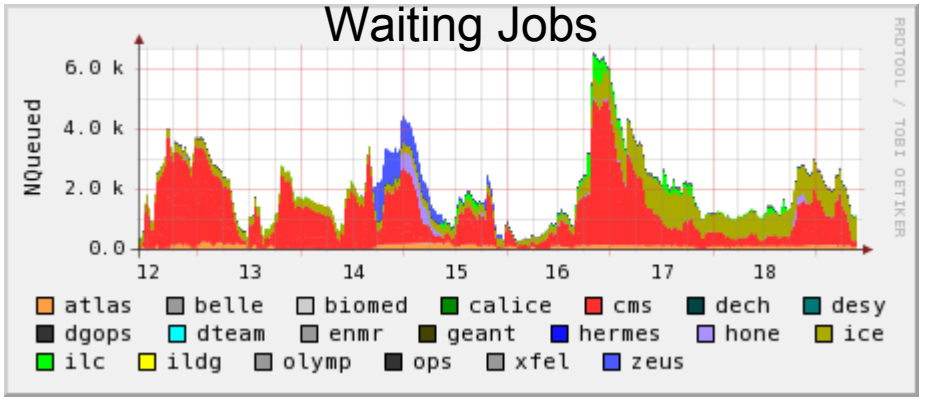
- Computing Resources: (CE) [SL5 / 64-bit]
  - `grid-cr4/5/6.desy.de` — 4784 slots @ 370 hosts
  - Total: — 37.94 kHepSPEC

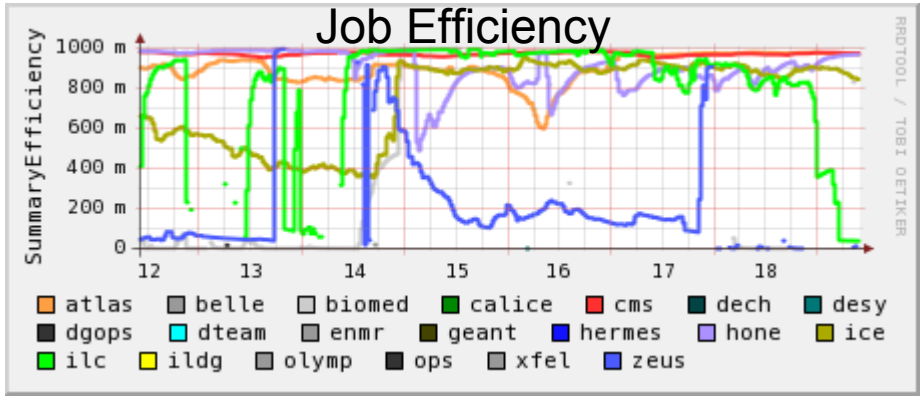
- (Disk) Storage Resources: (SE) (dCache)

`dcache-se-atlas.desy.de`	ATLAS:	1700 TB
`dcache-se-cms.desy.de`	CMS:	2300 TB
`dcache-se-desy.desy.de`	others:	300 TB
Total:		4300 TB

DESY Grid Center: Jobs at DESY-HH (weekly)







Belle2 @ DESY Grid Center

- The DESY Grid Infrastructure supports the VO '*belle*'
  - Already now, a considerable contribution could be made to the BELLE2 MC production due to the opportunistic usage model of the DESY Grid Center
  - BELLE2 resource requirements for Germany are ~10% of the resources at DESY-HH
  - Grid services such as WMS (Workload management Services) to submit jobs globally (!) are available at DESY for the VO '*belle*'
  - A commitment to add more resources (computing and storage) is possible
  - Support is in place via NGI_DE (National Grid) of EGI (European Grid Infrastructure)

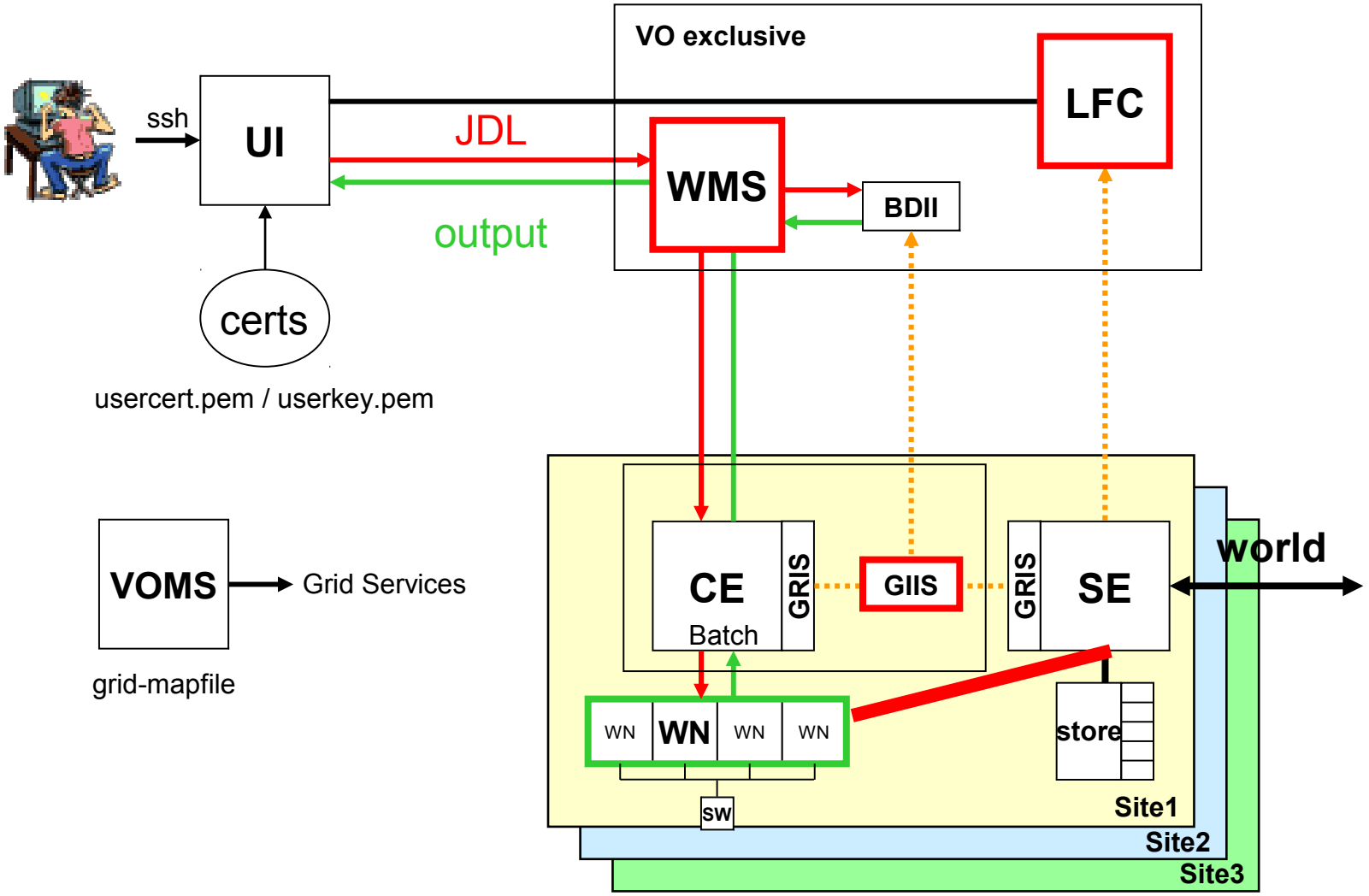
- National Analysis Facility (NAF) for BELLE2
  - complement to the batch-oriented globally accessible Grid
  - provides comparable amount of resources
  - optimized for interactive analysis
  - could be opened to the German BELLE2 community

Conclusions

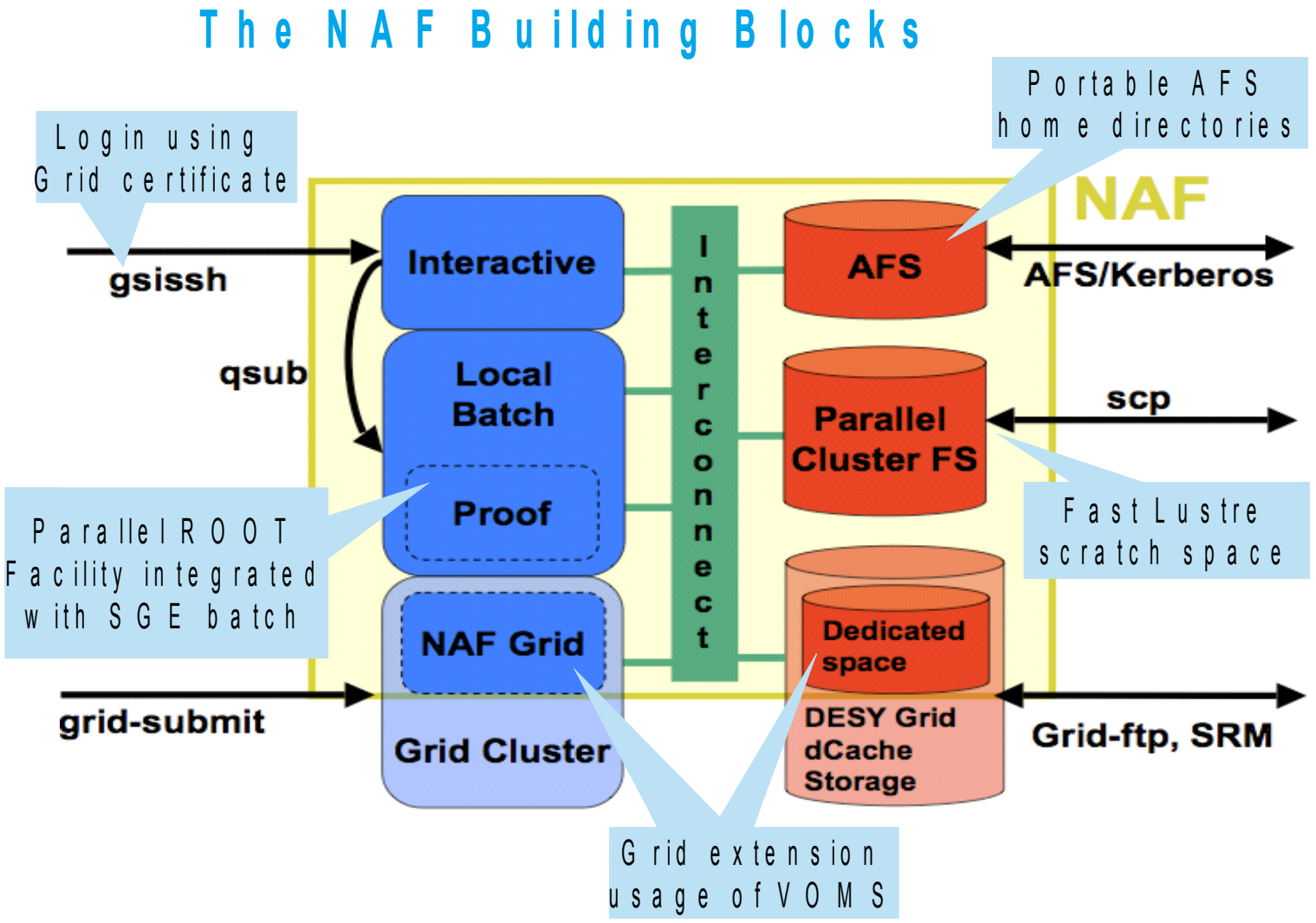
- The DESY Grid Center reflects the scientific computing at DESY
- *One* (generic) Grid infrastructure is run for *all* VOs, federating resources with opportunistic usage
- The NAF complements the Grid for interactive data analysis
- The VO '*belle*' is already supported by DESY-HH, incl. Grid services
- A commitment to add more resources could be made
- The NAF could offer complementary resources for BELLE2's data analysis in Germany

Appendix

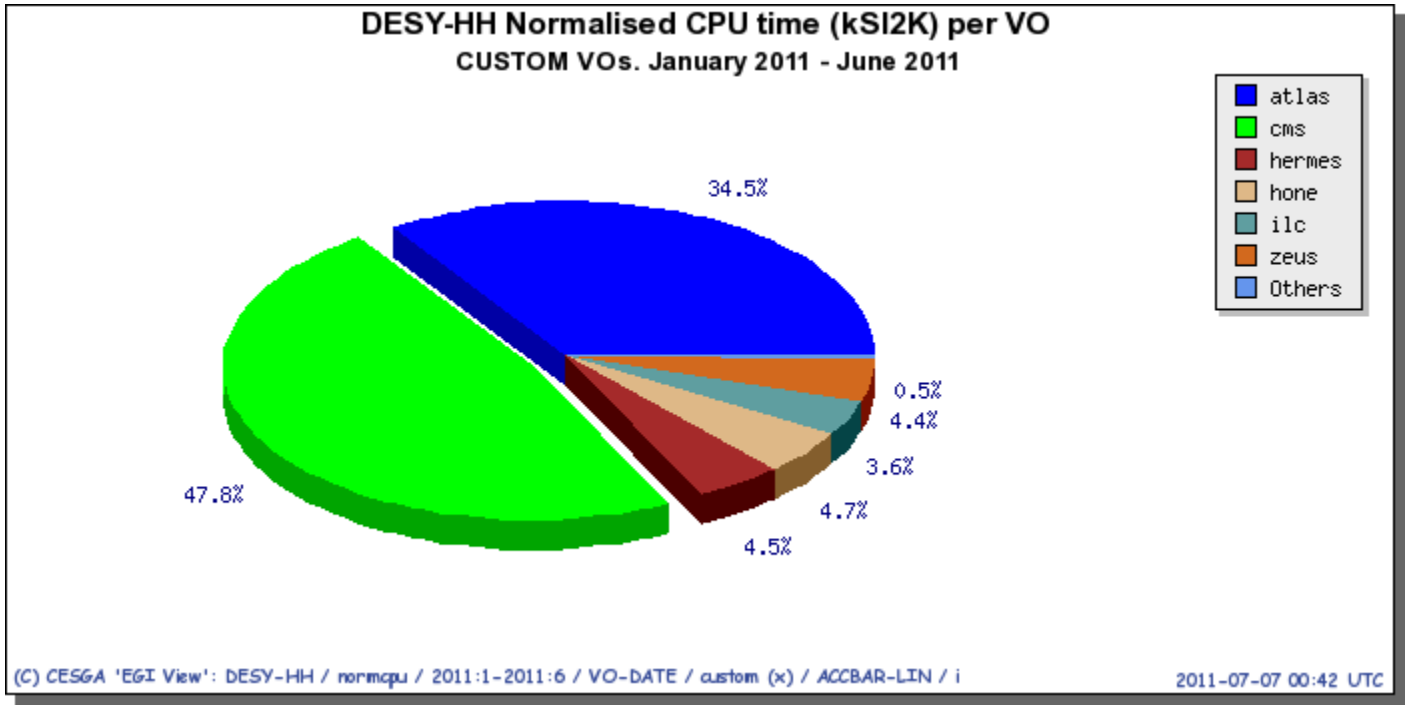
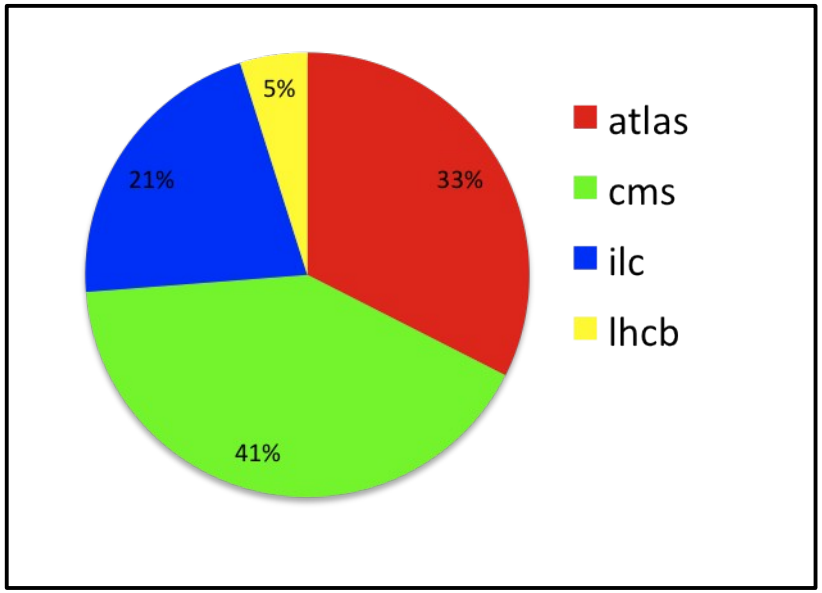
DESY Grid Center: Grid Infrastructure



DESY Grid Center: National Analysis Facility (NAF)



Statistics: Grid Production (all VOs)



Statistics: NAF usage by VO's