

Grid at DESY

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via EVO
Belle2 Grid Sites Meeting
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- Introduction

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 - Globally (Grid)
 - Nationally/regionally/locally (NAF)

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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



- 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]



> 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 ongoing

> Network:

- **LHCone:** dedicated connection between (big) sites (GridKa, CERN)



> Computing Resources: (CE) [SL5 / 64-bit]

- `grid-cr4/5/6.desy.de` 4784 slots @ 370 hosts
- **Total:** 37.94 kHepSPEC

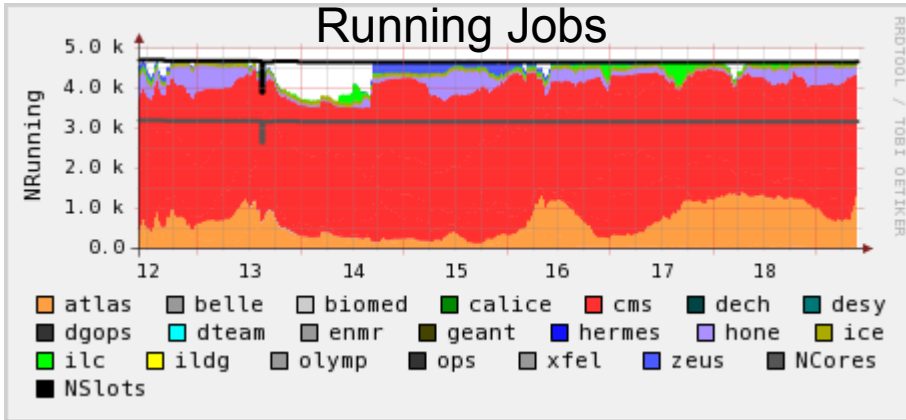
> (Disk) Storage Resources: (SE) (dCache)

- `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

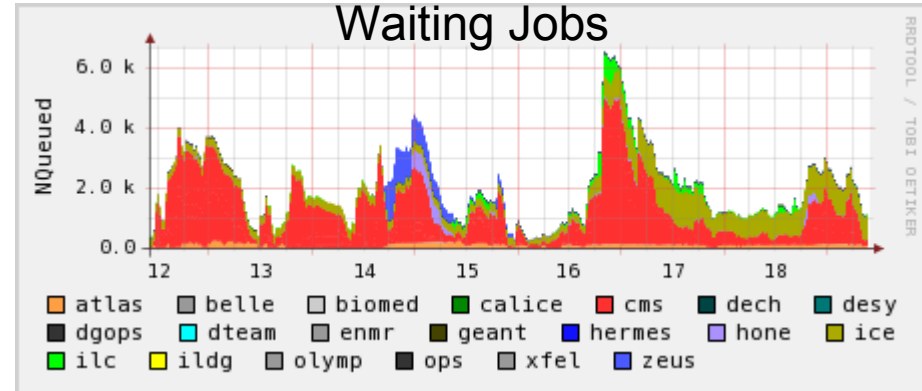


DESY Grid Center: Jobs at DESY-HH (weekly)

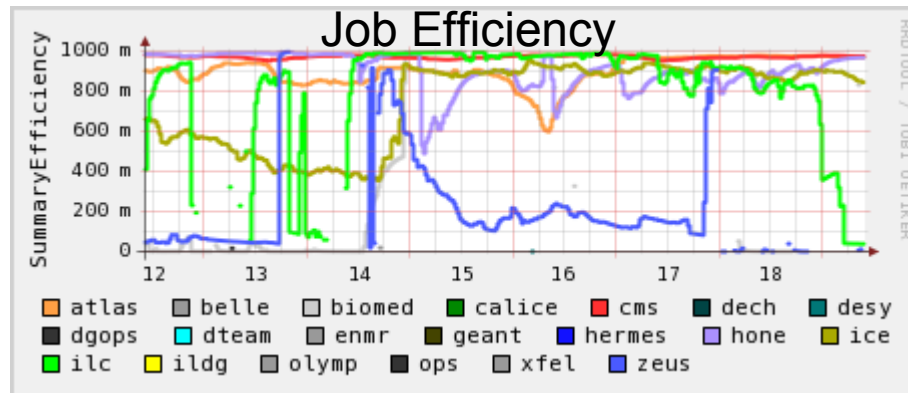
Running Jobs



Waiting Jobs



Job Efficiency



- 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



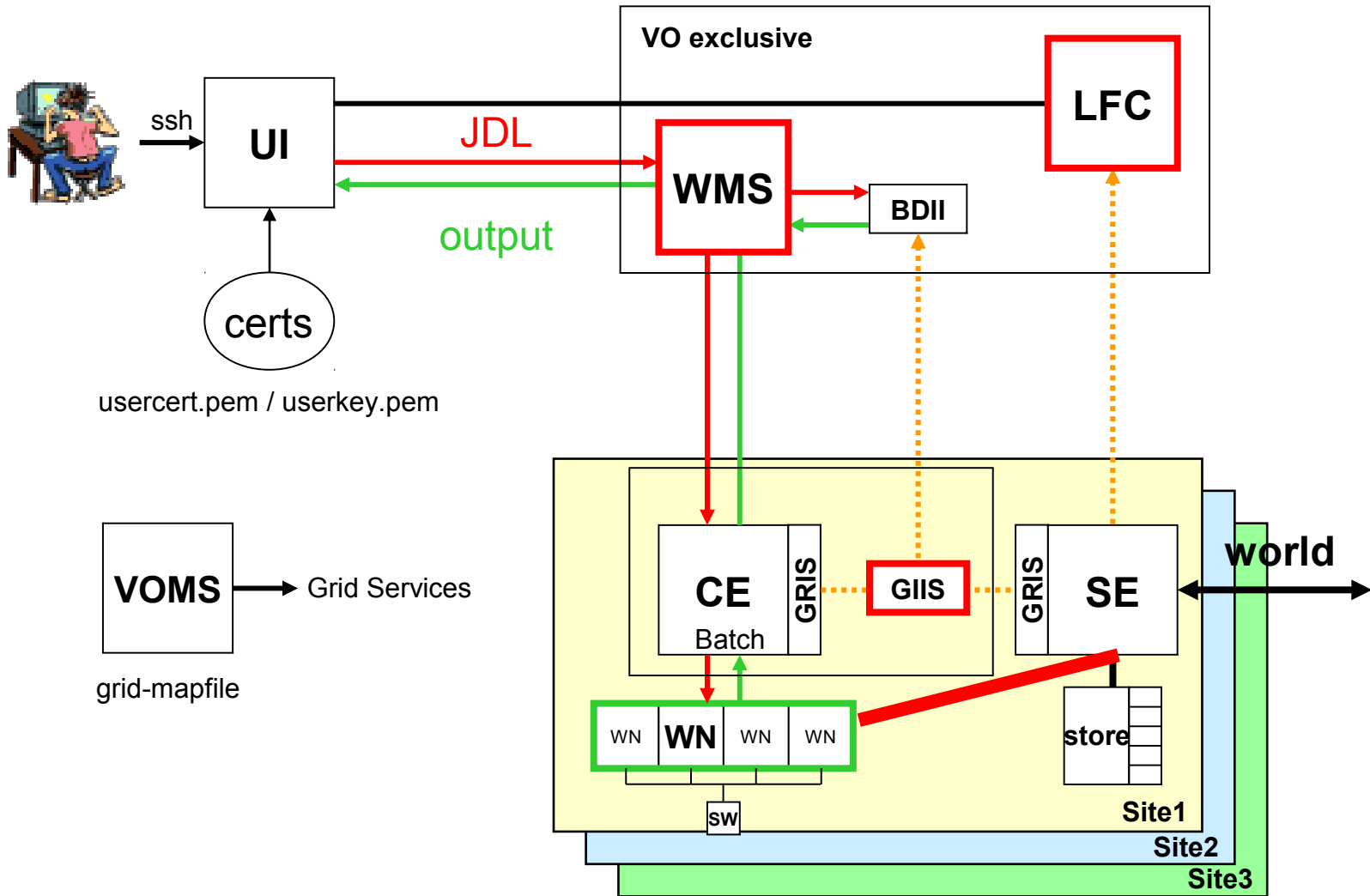
Conclusions

- 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; is this wanted?



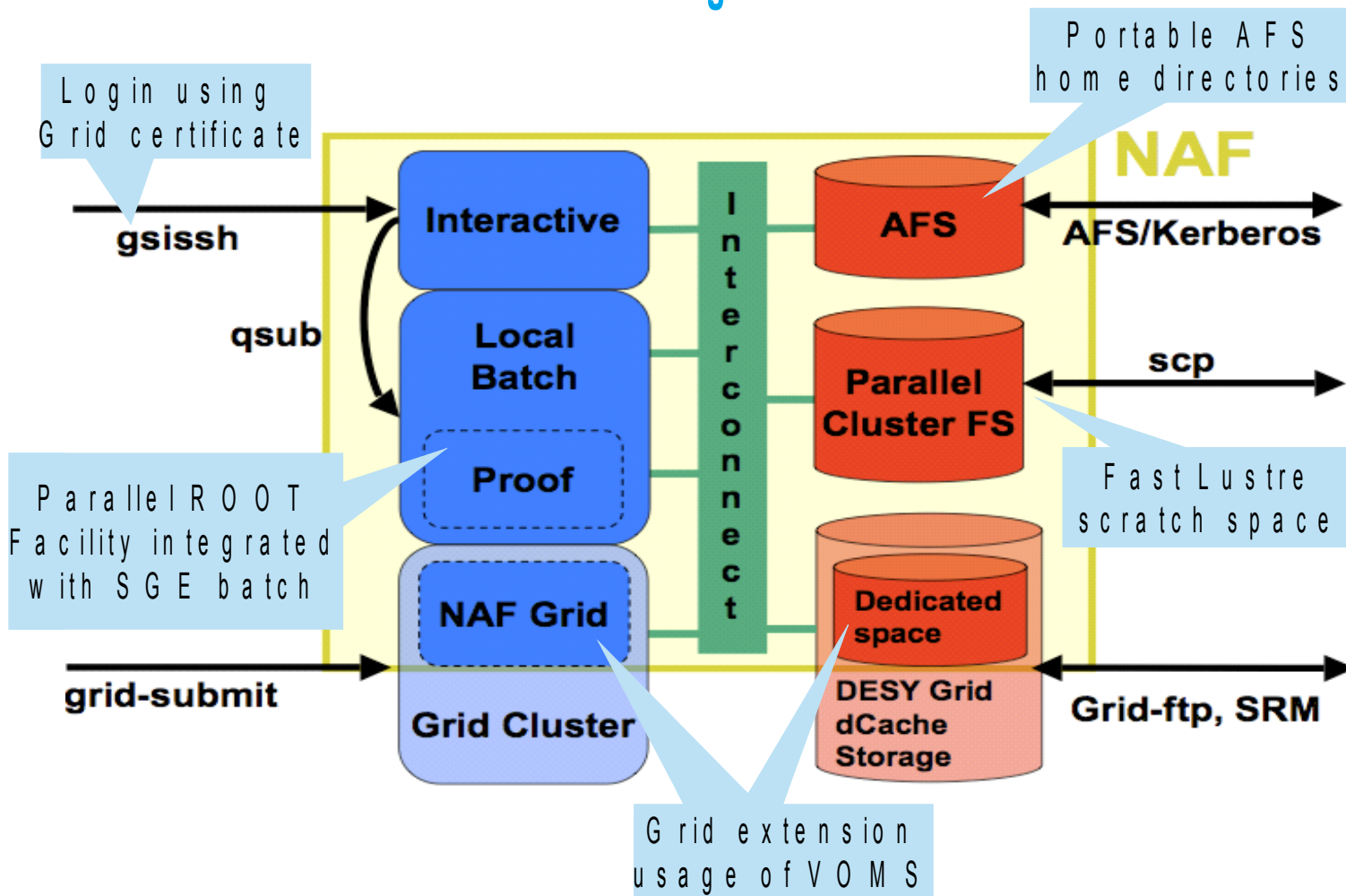


DESY Grid Center: Grid Infrastructure

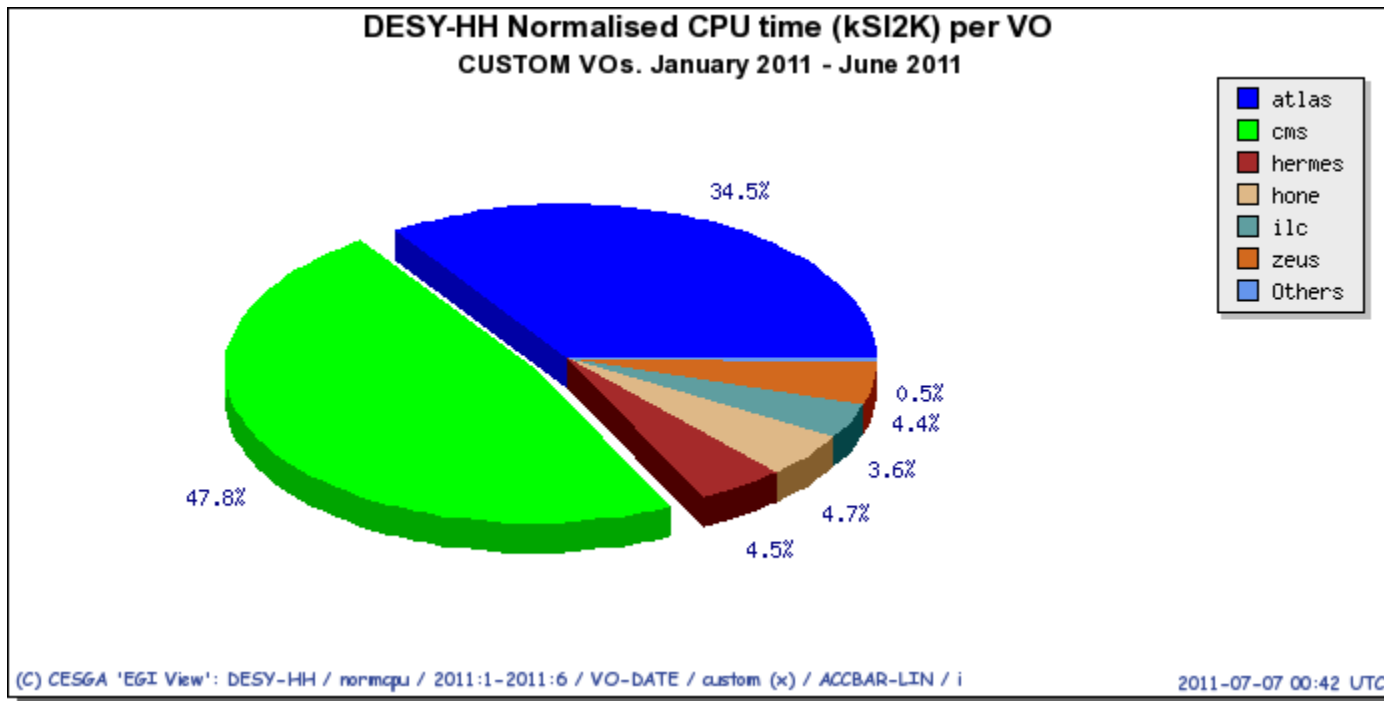


DESY Grid Center: National Analysis Facility (NAF)

The NAF Building Blocks



Statistics: Grid Production (all VOs)



Statistics: NAF usage by VO's

