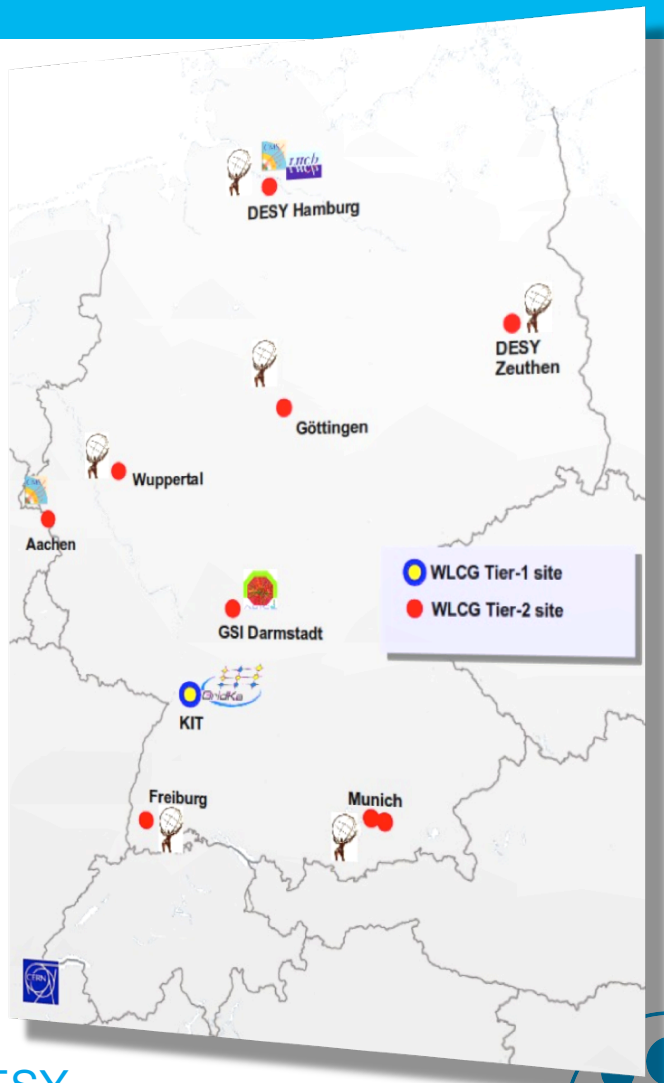
6th Annual Workshop of the Helmholtz Alliance "Physics at the Terascale"

Performance optimization for the present and next generation HEP data analysis on the Grid



Matthias Kasemann / DESY
- on behalf of the Grid Computing Board

HELMHOLTZ GEMEINSCHAFT

DESY

Distributed Computing for LHC Data Analysis: a success!

- The big success of the LHC physics programme was also possible because of the excellent performance of the LHC Computing Grid.
- German sites rank among the most-used and most-efficient sites in the WLCG.
- “Physics at the Terascale” has significantly contributed to the Grid infrastructure in Germany: T2 at University sites and NAF.
- Support was provided to all German Grid sites for Grid-based mass storage (dCache) and monitoring of site performance by the Alliance.
- Very visible contributions were made in virtualisation of resources, and monitoring of site performance and user jobs on the Grid.

DE-T2-Computing for LHC

	CPU (HS06)		Disk (PB)	
	2012	2013	2012	2013
ATLAS				
Sum 4xUni	18500	15000	3200	2800
Desy/MPP	17800	20300	2200	2400
Sum DE	36300	35300	5400	5300
ATLAS share	**11.4%**	**10.1%**	**11.3%**	**10.8%**
CMS				
Aachen	8900	7500	600	500
Desy	14700	16700	1350	1350
Sum DE	23600	24200	1950	1850
CMS share	**7.5%**	**6.9%**	**7.5%**	**7.1%**

DE- Computing for ATLAS

ATLAS–DE cloud per Site Jan-Sep 2012

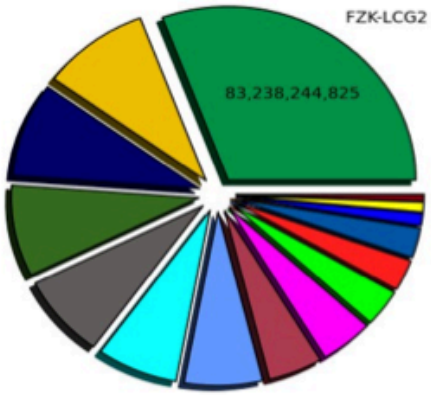
ATLAS-DE Anteil:

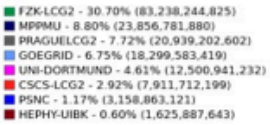
12% ATLAS gesamt

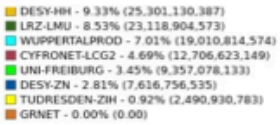
GridKa:	production 30%, analysis 18%
Desy/MPP :	production 21%, analysis 28%
University sites:	production 31%, analysis 26%
non-De sites:	production 18%, analysis 28%

Production

Wall Clock consumption All Jobs in seconds (Sum: 271,133,455,055)

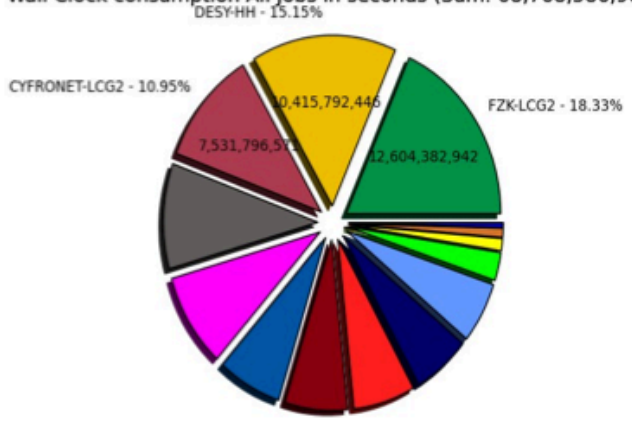






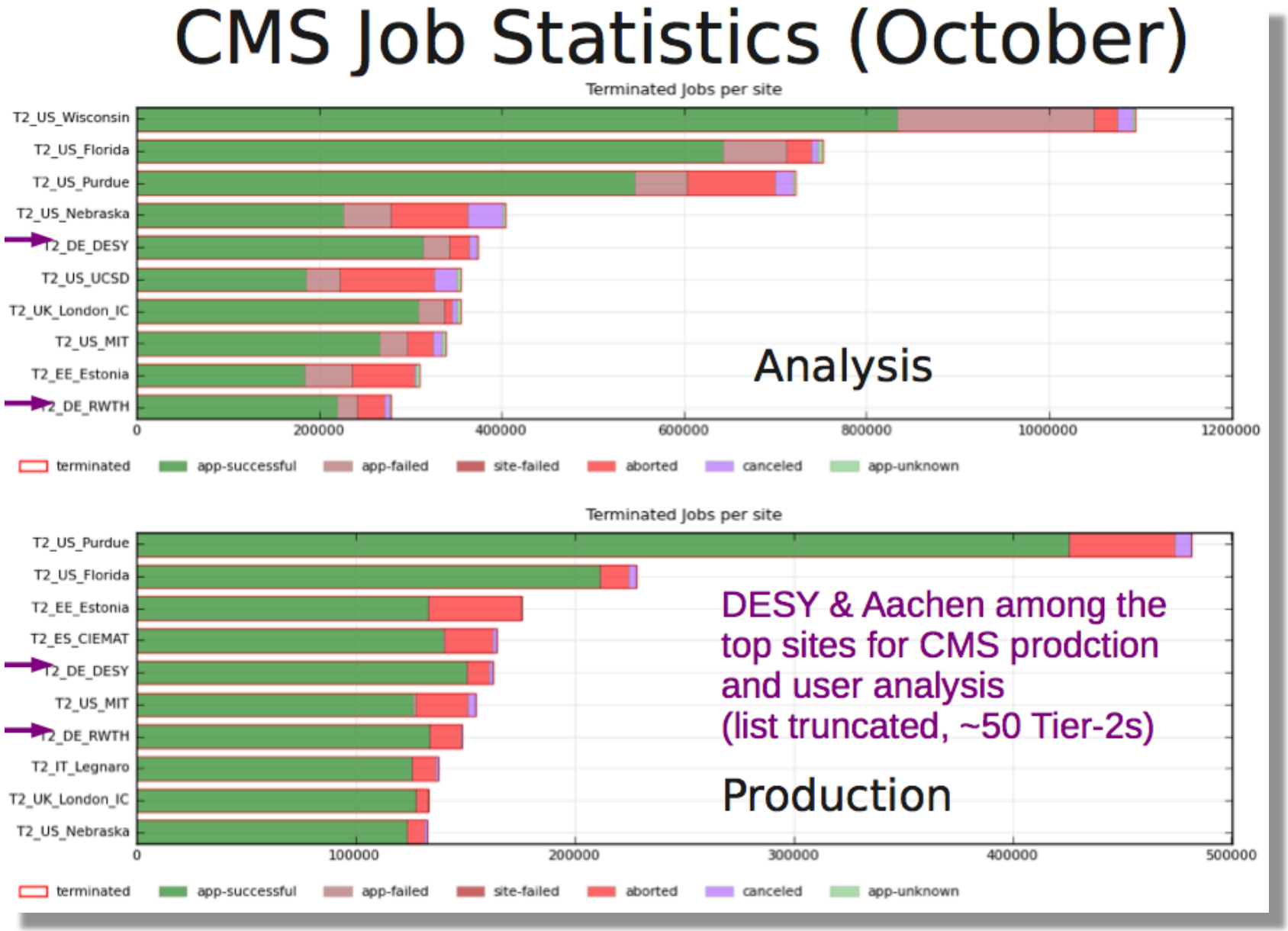
Analysis

Wall Clock consumption All Jobs in seconds (Sum: 68,768,586,907)



12/04/12 Guenter Duckeck, LMU 6

DE Computing for CMS



Computing for Analysis in 2013-2014

- For 2015 we must prepare to cope with the challenges of the restart of the LHC in the year 2015 at higher centre-of-mass energy and higher trigger rates.
- It is expected that data volumes are growing faster than funding for resources.
- Better technical tools, data reduction strategies and more efficient, flexible resource usage must be developed to cope with this challenge.
- It is essential to keep the expertise built up by the groups and enable them to continue to contribute to the successful operation of the Grid infrastructure in Germany.
- Goals for 2013-14 are to keep Germany's position with significant computing developments in High-Energy Physics.

To achieve these goals we need the contributions from Universities, from MPP, from GridKa and from DESY.

Computing in “Physics at the Terascale”

As funding is very limited we must focus on specific areas of prominent importance and with strong expertise by German groups:

1. Development of reliable and high performance access to LHC data through the dCache project *(RWTH, DESY, Wuppertal)*
2. Performance monitoring of Grid jobs, sites and services *(Göttingen)*
3. Virtualisation techniques and the management of job submission and workflows on the Grid infrastructure *(KIT-Süd, LMU)*
   - exploration of new technologies like cloud computing
4. Improvement of networking connections in Germany and the international connectivity *(DESY, KIT-Nord)*
5. General support for site operations, training and schools *(KIT-Nord)*

PHYSICS AT THE TERA SCALE Helmholtz Alliance

DESY

Resource planning and participating institutes

List of participating Institutes

Participating Helmholtz Centres	**Location**	**Group Leader**
Deutsches Elektronen Synchrotron	Hamburg & Zeuthen	V.Gülzow, P.Fuhrmann
Karlsruhe Institute of Technology	Karlsruhe	G.Quast
Participating Universities		
Rheinisch-Westfälische Technische Hochschule Aachen	Aachen	Th.Kreß
Georg-Augstus-Universität Göttingen	Göttingen	A.Quadt
Ludwig-Maximilian-Universität München	München	G.Duckeck
Bergische Universität Wuppertal	Wuppertal	T.Harenberg

Work package	**Centre/Partner**	**Personnel financed by Alliance**	**Personnel financed through institute or third party funding**
WP1: Grid-enabled storage systems	RWTH Aachen	½	½
WP1: Grid-enabled storage systems	DESY	½	½
WP1: Grid-enabled storage systems	Wuppertal	½	½
WP2: Performance Optimization + Monitoring	Göttingen	½	½
WP3: Job and Workflow Management	KIT-Süd	½	½
WP3: Job and Workflow Management	LMU München	½	½
WP4: Wide-area network in Germany and international connectivity	DESY, KIT-Nord	0	0
WP5: General support for site operations, training and schools	KIT-Nord all sites	0	0
Total requested positions		**6 x ½**	**6 x ½**

Computing Organization for 2013-14

- It is proposed to rename the “Grid Project Board” to “Computing Board” to reflect the change of focus on all computing aspects for LHC data analysis.
- It is proposed to enlarge the computing board to include representatives from all German sites offering T2 resources for LHC analysis

  (DESY, Göttingen, Wuppertal, RWTH, KIT, LMU, MPI, Freiburg)
- This will fully enable the Computing board as a communication and coordination forum for all aspects of German Computing for LHC Data analysis
- One workshop per year is envisaged to discuss the status of computing for data analysis and to exchange ideas and steer future directions.