

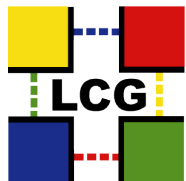
# WLCG GridKa+T2s Workshop

Munich, Sep. 18<sup>th</sup>-19<sup>th</sup>, 2006

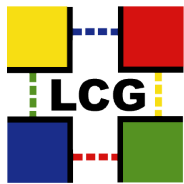
## RWTH Aachen (Germany) Tier2 Site Report

Thomas Kress for the Tier2 Team:

M.Giffels, C.Hof, Th.K., B.Mura, A.Nowack,  
D.Tornier and A.Flossdorf (DESY Hamburg)



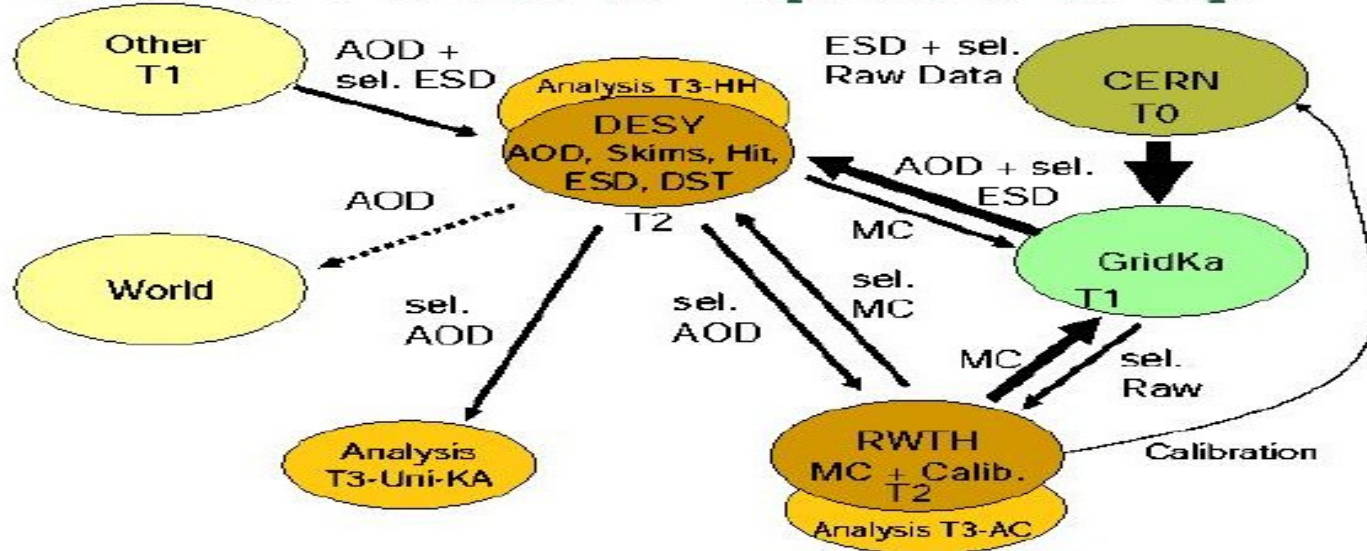
Worldwide LHC Computing Grid  
Distributed Production Environment for Physics data Processing



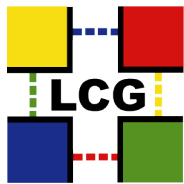
# The CMS German Federated Tier2

1/2 (RWTH Aachen) + 1 (DESY Hamburg) avg. CMS T2

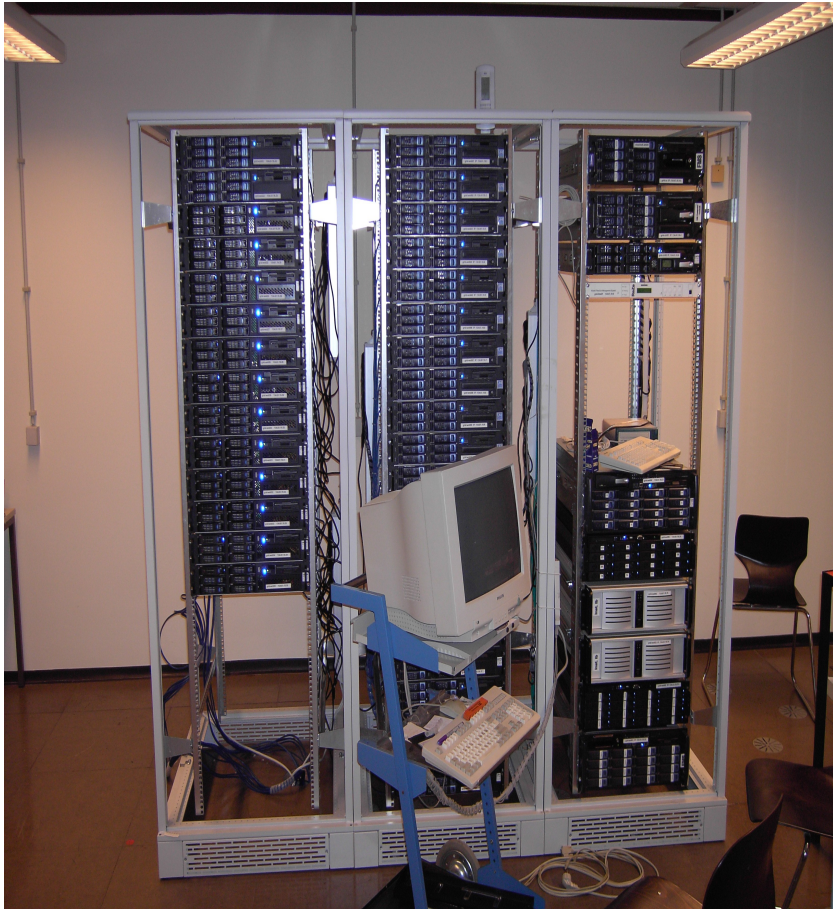
A Federated Tier2 Center for CMS provided by  
RWTH Aachen and DESY – Operational Concept



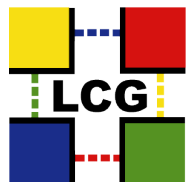
Focus for Aachen on MC prod. & calib.; DESY analyses + MCP





# RWTH Aachen Tier2+3 Prototype

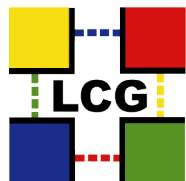


- ~100 modern WN processors  
good experience with dual core Opterons  
1 GB RAM per proc., large local disk and 1  
(of 2) Gbit/s LAN per box (2CPU/1-2core)
- 1\*CE, 2\*control/service nodes
- 7\*SE  
3 GHz single Intel CPU, 3 GB RAM, 2\*Gbit/s  
in kernel bonding, Raid 5 (8-Ports) or Raid6  
(16-ports) commodity SATA disk boxes  
good exp. with Areca Raid6,16-p controller
- Institute server room  
30 kW cooling system
- Cisco 3750 GBit/s stack  
so far 2\*Gbit/s uplink to Dept. Cisco 45k



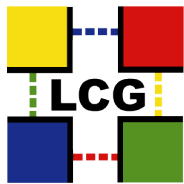
## Configuration, Services, ...

- 1 classial SE (legacy)
  - NFS,ro automount to desktop cluster (130 CPUs, 3 CMS instit.,Condor)
- 6 SEs (and local WN disks) in dCache
  - pnfs on service node in Raid1 with fast 75 GB Raptor SATA disks
  - DNS round-robin for srm-cp (one DB!)+ grid-ftp(load balanc. for protocol)
  - dcap access (root!) from desktop cluster (load control by # movers)
  - access to Aachen IT center's Tivoli tape system in good progress
  - inter-site dCache coupling Aachen-DESY under consideration
- T0/T1 DB access by Frontier/Squid proxy
  - 300 GB in Raid1 on service node
- Monitoring  and installation  quattor
  - do not (want to) use also yaim, quattor also for desktop cluster soon
- Glite 3.0.2, mon.+CMS+DCMS(legacy) VOs, dcms VOMS
- OpenPBS (MCprod>dcms>cms), no local user mapping



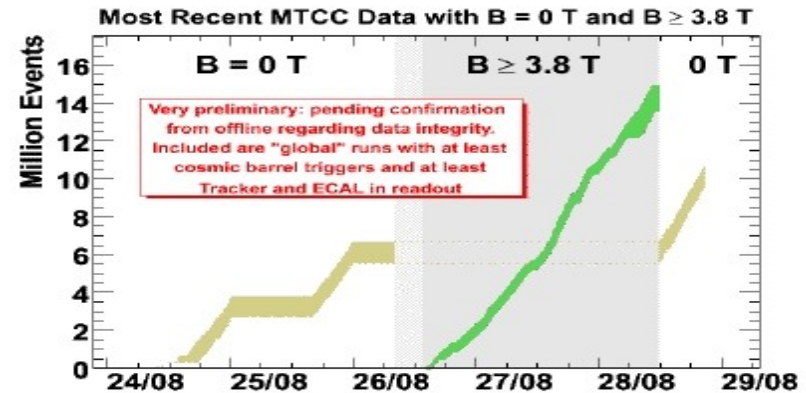
## Personal, Ramp-up, ...

- Prototype cluster in LCG since ~2 years
- CMS will stay as dominate VO, in future some further VOs (med.(Geant4), astroparticle) likely
- Presently about 3 scientific FTEs, ~5 hopefully soon
  - extent. expertise in CMS software installation, CMS MC prod., Quattor
- Resource planing:
  - **2006:**
    - ✓ 140 kSPECint2k, 25 TB SE disks,  $\geq 1\text{Gbit/s}$
  - ➔ **2007/2008:**
    - ✓ Funding for CMS Tier2 + subst. Tier3 approved, IT centre availab.
    - ✓  $\frac{1}{2}$  average CMS Tier2 (1.5 together for German CMS T2 federation)
  - ➔  $\geq 2009$ :
    - ✗ a few projects for further funding identified / application phase

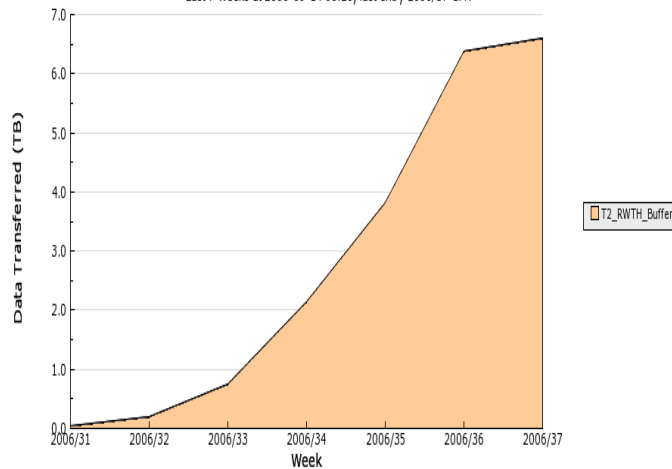


# Contributions to SC4

- MTCC
  - Magnet Test and Cosmic Challenge
  - Low latency data transfer from T0
  - Tier0 conditions data base access by Frontier/Suid

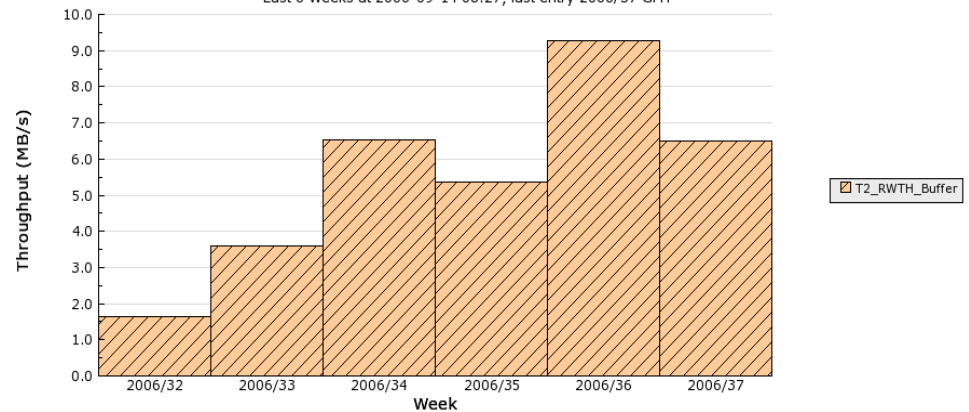


PhEx Prod Data Transfers By Destinations matching 'RWTH'  
Last 7 Weeks at 2006-09-14 08:28, last entry 2006/37 GMT

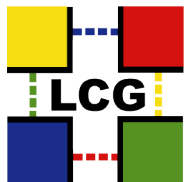


7 TBytes in 6 weeks

PhEx Prod Data Transfers By Destinations matching 'RWTH'  
Last 6 Weeks at 2006-09-14 08:27, last entry 2006/37 GMT



~5 MBytes/s rate

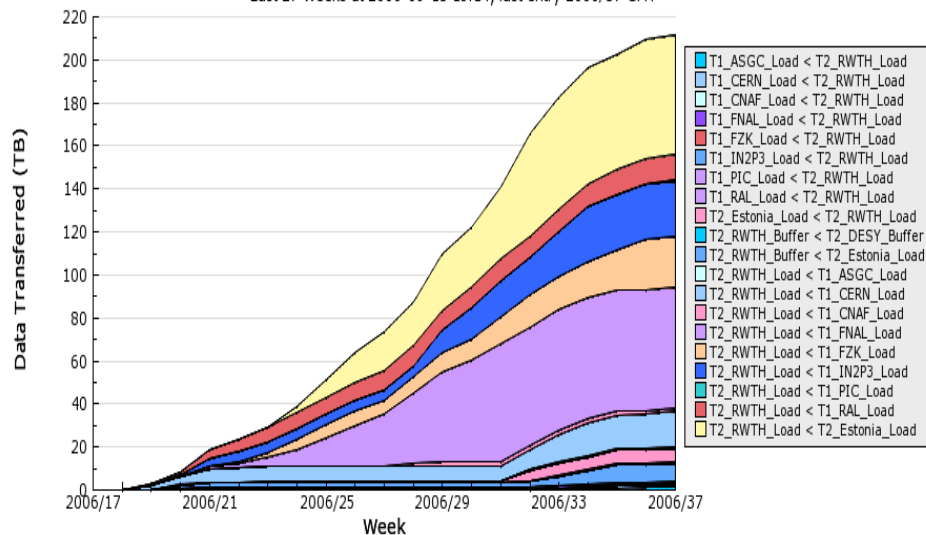


# Contributions to SC4

- Transfer load tests
  - CMS set up matrix for data export and inport of all CMS T1s and T2s
  - data dropped from disk soon after transport, vetos configurable by site

PhExEx SC4 Data Transfers By Links matching 'RWTH'

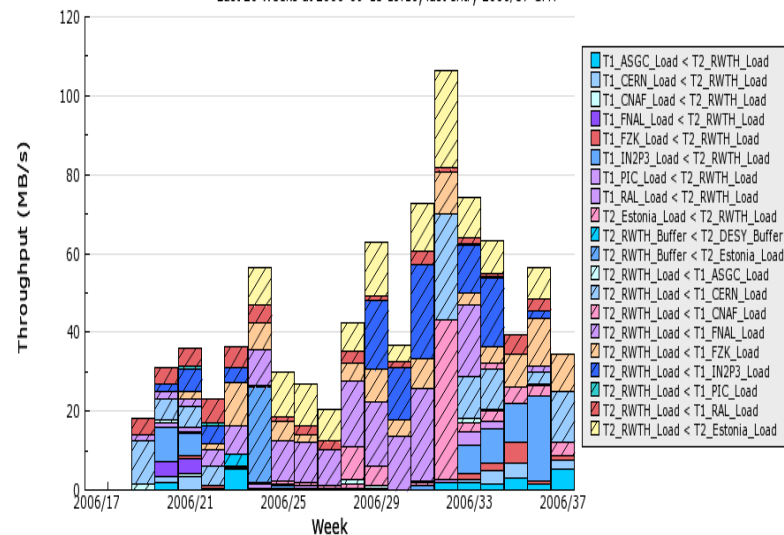
Last 27 Weeks at 2006-09-13 15:14, last entry 2006/37 GMT



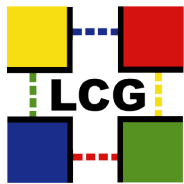
210 TBytes transferred in 27 weeks

PhExEx SC4 Data Transfers By Links matching 'RWTH'

Last 26 Weeks at 2006-09-13 15:16, last entry 2006/37 GMT

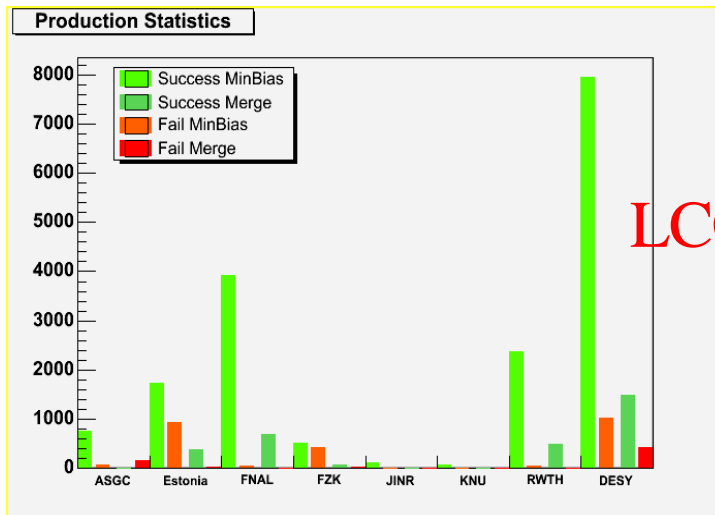


~45 MBytes/s avg. Rate (w/o MTCC)

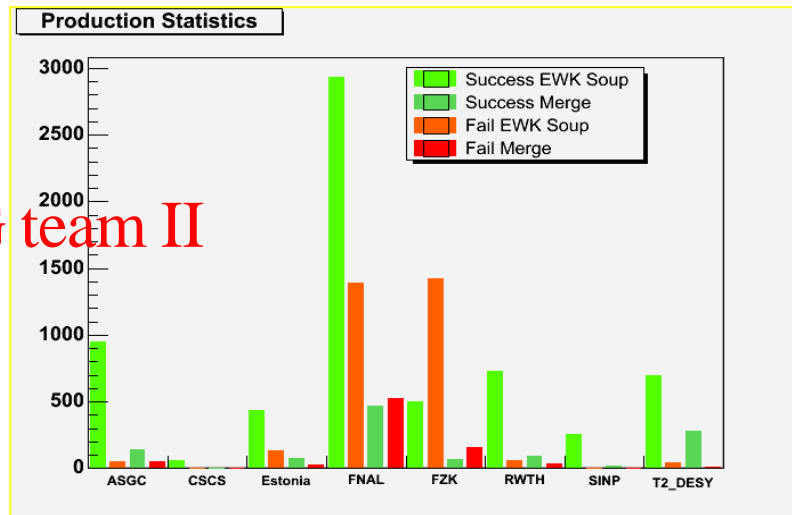


# Contributions to SC4

- Monte Carlo production
  - Grid-based system, 1\*USA + 3\*Europe (incl. RWTH/DESY) support teams
  - so far gen+sim+dig steps, few 100 evts/job, jobs merged and sent to T0, pile-up and reco (s.w. not yet ready) later at T0 during CSA06

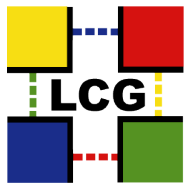


LCG team II



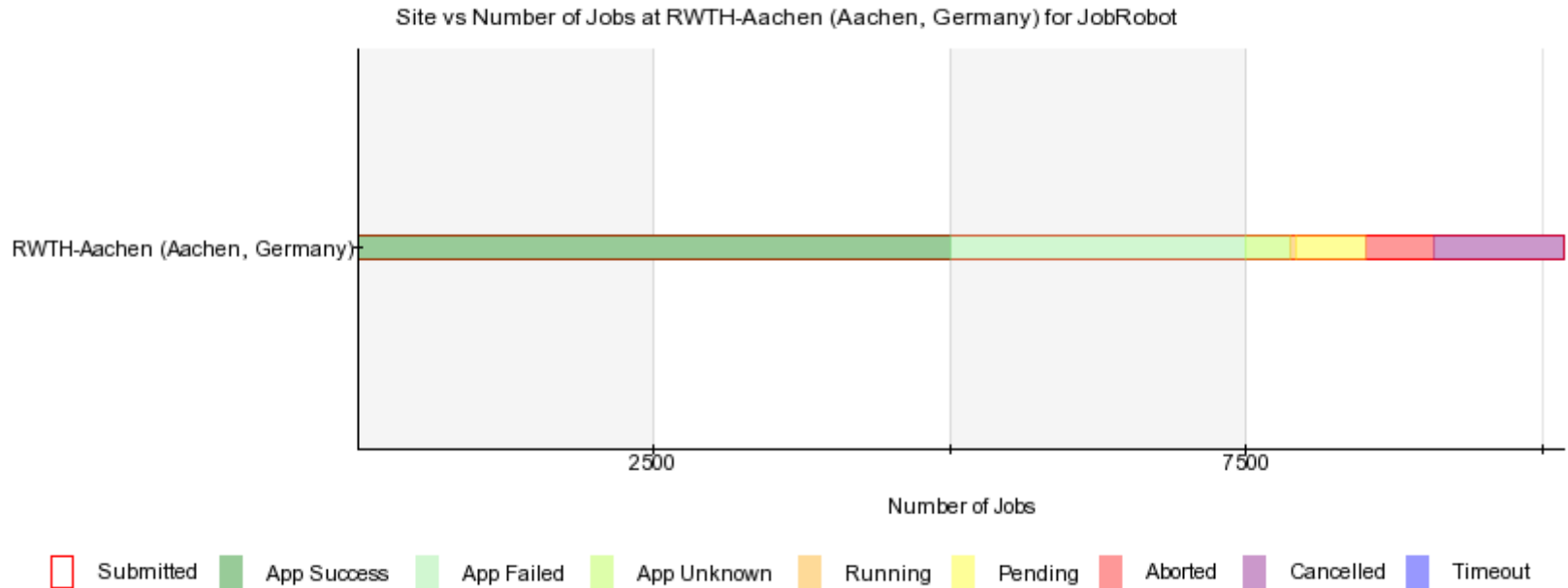
In general 90% of failures due to stage-out problems  
RWTH Aachen (and DESY) significant and reliable contribution  
'Private' MC production also possible (local DBS, DLS)



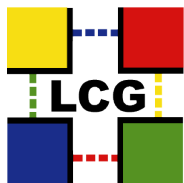


# Contributions to SC4

- Grid analysis job performance monitored by JobRobot  
→ during August:

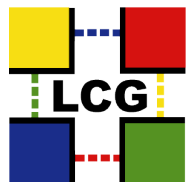


As for most sites Grid success rate  $O(90)\%$  but overall success less  $O(50)\%$   
Recent failures due to out-of-date software version needed by job robot



## From SC4 to CSA06 / Wish List

- **CMS Computing, Software and Analysis challenge**
  - from October until November 13
  - goal is to test 'whole chain' T0 -> T1 <-> T2
  - skimmed data will be sent from T1s to T2s using FTS channels
  - continuous Grid user analysis jobs at T2s
  - monitoring of job rate, job efficiency, rate of I/O to storage
  - in parallel some MC production at T2 sites
- **Wish list** (especially for multiple VO sites and/or smaller sites with limited manpower and budget)
  - LCG to Glite transition was a pain!-> middleware developers have to provide in parallel well tested installation fabric tools (pref. Quattor)
  - (IMHO) virtualisation (e.g. Xen) will be important for the success of the Grids to allow for OS flexibility and better usage of servers/services.



## Conclusions

- x RWTH Aachen + DESY -> German Federated CMS Tier2
- x Tier2/3 prototype in Aachen for CMS since 2 years
- x fully integrated in Grid, LCG, CMS computing
- x only one VO allows for fully flexible system tailored to the needs of CMS; fast direct communication with CMS colleagues on site very usefull and stimulating
- x although presently still only moderate resources, substantial contributions to SC4 since very reliable system and enthusiastic and competent support team
- x strong participation in CSA06 (postSC4) planned
- x significant increase of hardware + FTE resources soon