HGF Grid Computing



Physics @ Terascale Workshop, 28.11.2008 G. Duckeck, LMU München

- Overview
- Tier-2 Status
- Projects
- ATLAS/CMS Status



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GridKa Tier-1/Tier-2 Map



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Aachen Tier-2

- Funding by HGF, DGrid, RWTH
 - 2000 CPU cores
 - 550 TB Disk Storage (dCache)
 - 2*10 Gbit to DFN/X-Win
- Together with DESY main German Tier2 for CMS
 - 90% of resources for CMS
 - 5% Auger, 5% IceCube
- Only fraction of resources pledged for WLCG/CMS
 - Mixed Tier2/Tier3 operation via VOMS groups
 - Different shares for CMS and cms/dcms



Freiburg Tier-2

- Funding by HGF, DGrid, BW
 - 770 (1040 '09) kSI2k CPU
 - 115 (330 '09) TB Disk Storage (dCache)
- With Wuppertal 1 (out of 3) 'average' ATLAS T2s in D
- VOs served: ATLAS, ILC, ghep, dech, dteam, bfg
- Cluster embedded in interdisciplinary Black Forest Grid initiative which provides additional computing resources

Wuppertal Tier-2

- Funding by HGF, DGrid, BW
 - 926 CPU cores
 - 300 (650 '09) TB Disk Storage (dCache)
 - Addtl Lustre shared FS for interactive analysis
- VOs served: ATLAS, Auger, IceCube, D-Grid
- Move to new building next year
 - 10Gbit/sec Interconnect
 - Planned: xrootd cluster





LMU München Tier-2

- Operated together with LRZ center
 - Part of big Linux (SLES10) cluster used by LMU, TUM, FHM
 - VOs served: ATLAS, DGrid
- Funding by HGF, DGrid, LMU
 - 660 (1370 '09) CPU cores
 - 300 (500 '09) TB Disk Storage (dCache)
 - Large Lustre shared FS
- Only fraction of resources pledged for WLCG/ATLAS
 - Tier2/3 sharing via VOMS groups to be implemented
 - With partner MPP/RZG 'average' ATLAS T2s in D
- Proof testbed for interactive ATLAS analysis
- Muon Calibration center direct T0-T2 RAWD stream HGF AC, 28.11.08



Göttingen Tier-2

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- Federated ATLAS Tier-2 with Desy
- GoeGrid site, funding by DGrid, state/local
 - 1800 Cores (min. 2.66 GHz) \triangleq 5000 kSI2k
 - 1040 for ATLAS
 - 450 TB storage
 - HGF funding for next years equivalent 1 FTE
- VOs served: ATLAS, all of DGrid
- Only fraction of resources pledged for WLCG/ATLAS

HGF Tier-2 Summary

- HGF funded Tier2s well established and operational
- Fruitful cooperation between sites
 - Acquisition, Monitoring, VOMS support
 - dCache Setup and Administration
- German Tier-2s provide substantial CPU/storage resources
 - HGF funding is basis
 - DGrid and other funding on top
 - *defacto* combined capacity larger than GridKa T1
- Effective integration and support of user groups is a challenge (at least in case of ATLAS)

HGF Grid Projects: dCache

- Most-used storage system in LCG :
 - 8 of 11 Tier1, all D Tier2s, many others



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HGF Grid Projects: dCache-support

- Goal: supporting dCache at Tier-2s and Tier-3s within HGF alliance, in collaboration with:
 - dCache developers & dCache competence center of D-Grid
 - EGEE/WLCG (storage group around Flavia Donno)
 - Positions at RWTH, DESY, FZK/KIT and LMU Munich
- Status:
 - GGUS 2nd level service support group 'dCache experts' and support in relevant dCache forums
 - Documentation on a T2/T3 typical dCache installation
 - Hands-on dCache workshops (w/dCache developers):
 - April, 29-30, 2008, in Cologne
 - April, 6-7, 2009, in Aachen
 - dCache PPS testbed currently being set up

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HGF Grid Projects: dCache Who is contributing (Organisations)



Focus moving from development to support.

HGF Grid Projects: Monitoring

- Huge Zoo of monitoring tools
 - Site operations: Ganglia, Lemon, Nagios, ...
 - (Sub-)Grids: GocDB, GridView, SAM, ...
 - Experiment specific: dashboard. phedex, production, ...
- Goals within HGF:
 - not another one but complement/combine.
 - Wuppertal group:
 - JEM (Job execution monitoring)
 - Instrument job scripts for step-by-step monitoring plus system watchdog -> Info fed to RGMA
 - GridXP: collect&classify job&site problems to help users/systems
 - Karlsruhe/Göttingen:
 - Meta-Monitoring: Collect&tailor monitoring information from arbitrary resources

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HGF Grid Projects: Monitoring -2

JEM

GridXP



HGF Grid Projects: Monitoring-3

- Happy-Face Project KA
 - used for
 CMS specific
 GridKa
 operation



Last Update: Wed, 20. Feb 2008, 14:15



SAM (FZK-LCG2)

Service Type	Service Name	Test	Time	Status
CE	a01-004-128.gridka.de	CE-cms-mc	2008-02-19 14:17:12	error
CE	ce-1-fzk.gridka.de	CE-sft-job	2008-02-04 09:11:43	error
CE	ce-2-fzk.gridka.de	CE-sft-job	2008-02-19 14:50:42	error
CE	ce-2-fzk.gridka.de	CE-cms-mc	2008-02-19 07:41:36	error
SRM	gridka-dCache.fzk.de	SRM-v1-get	2008-02-19 13:57:55	error
SRM	pps-srm-fzk.gridka.de	SRM-v1-get-metadata	2008-01-12 21:29:07	<u>warn</u>
SRM	pps-srm-fzk.gridka.de	SRM-v1-advisory-delete	2008-01-12 21:29:08	warn
SRM	pps-srm-fzk.gridka.de	SRM-v1-put	2008-01-12 21:29:07	<u>warn</u>
SRM	pps-srm-fzk.gridka.de	SRM-v1-get-pfn-from-tfc	2007-12-21 15:16:27	<u>warn</u>
SRM	pps-srm-fzk.gridka.de	SRM-v1-get	2008-01-12 21:29:08	<u>warn</u>

CMS dashboard values (FZK-LCG2) for the activity: production

 Similar approach started for ATLAS GridKa cloud monitoring by Göttingen group

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HGF Grid Projects: Virtualisation

- Virtualisation of services is very dynamic field
 - redundant services, high-availability systems, ...
- activities of KA & Desy-HH:
 - single box gLite installation:
 - gLite setup requires >= 4 servers (CE, SE, MON, BDII, ...), heavy investment for small sites.
 - Virtual-servers: all in one --> get small institute cluster in Grid
 - shared cluster operation:
 - frequent use case: big computing centre cluster shared by several groups with conflicting requirements on OS environment
 - worker runs on some OS version:
 - batch job loads required VM image first: SLC4.7.1.1-preAtlas-0815
 - some overhead but very promising approach...

HGF Grid Projects: Training & Tutorials

- NAF Tutorials
 - (see previous talk)
- GridKa school
 - since 2003
 - joint event for DGrid, EGEE, HGF
 - ~120 students from 14 countries
 - next planned Aug 31st to Sep 4th 09
- VO specific training
 - user analysis, Ganga, NAF connected to ATLAS-D workshop,



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CMS Computing Status

GridKa: Successful data-import in summer 2008, 10-20 TB/day:



Tier 2 Sites RWTH Aachen and DESY very successful in MC production and user analysis jobs

Among first Tier-1 to import Sep 08 beam data



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ATLAS Computing Status



Data analysis tests

- So far main focus on MC production and data distribution
- Systematic tests for User reconstruction/analysis just started
 - Very different requirements (cf MC production)
 - I/O bound, local access to storage system
 - processing of many 100-1000 files
- 1st test at GridKa in Aug 08:
 - ATLAS&CMS>500 simultaneous jobs
 - I/O up to 2 GB/s
 - no negative interference observed



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Further ATLAS analysis tests in DE cloud: CPU/walltime



Conclusions

- HGF provides crucial funding basis to establish Tier-2 resources in D
- HGF Tier-2s all fully functional and integrated in routine WLCG/ATLAS/CMS operations
- HGF Grid projects focussed on dCache support and specific areas to fill gaps/complement existing tools.
- Main services in DE Tier-1/Tier-2 cloud well tested and functional --> ready for LHC data taking
 - nevertheless a few issues remain:
 - stability of sites and services
 - tape reading performance for reprocessing at Tier-1
 - optimizing I/O performance at Tier2s for analysis

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