GoeGrid

a resource center for grid related activities in Göttingen

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resource center GoeGrid

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outlook

- the resources of GoeGrid are located at GWDG
- GWDG is the joined computer and competence center of the University Göttingen and the Max Planck Society
- GoeGrid uses only a part of the resources.
- the complete resources of GoeGrid are open to all participating groups
- the actual available share for GoeGrid users is steered by scheduling mechanisms

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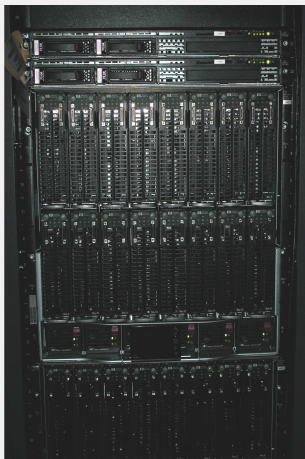projects

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outlook

- special investments of d-grid (2006,2007,2008)
- special investments on academic engagement to university
- investments of GWDG
- main computing resources bought in 2007
- main data resources bought in 2007 and 2008

resources

technology Intel Xeon	freq (GHz)	l. disk (GByte)	nodes	cores	peak (TFlop/s)	D-Grid
2 Dual Core	3.00	400	13	52	0.63	←
2 Quad Core	2.66	1.500	30	240	2.55	
2 Quad Core	2.66	292	78	624	6.64	←
2x2 Quad Core	2.83	240	48	768	8.69	
Sum				1.684	18.51	

Group	cores		perc
GWDG	2x8+2x4=	24	1.4
MediGRID	11x4+37x8=	340	20.2
TextGrid	7x8=	56	3.3
HEP Grid	32x8=	256	15.2
Sum D-Grid		676	40.1
LCG,atlas	48x16=	768	45.6
physics	30x8=	240	14.3
Total Sum		1684	100.

data resources

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- data resources for MediGRID, Textgrid and the theory group of the physics department use the data resources provided by the SAN infrastructure of GWDG
- the high energy physics uses data storage directly attached to the cluster and organized as dCache storage
- there is additional archive capacity provided by by the archive infrastructure of GWDG. This is at the moment only used by Textgrid.
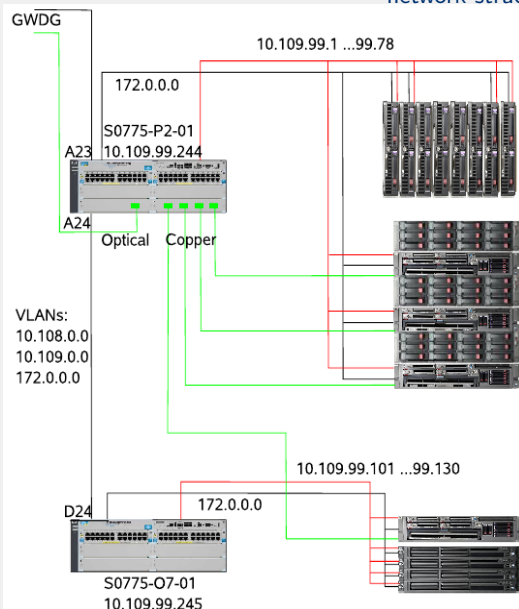
technology	capacity (TByte)
SAN	300
dCache	570
Archive	230

resources

network structure

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GWDG

172.0.0.0

10.109.99.1 ...99.78

S0775-P2-01
10.109.99.244

A23

A24

Optical   Copper

VLANs:
10.108.0.0
10.109.0.0
172.0.0.0

10.109.99.101 ...99.130

D24

172.0.0.0

S0775-O7-01
10.109.99.245

history of GoeGrid

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- common activities of grid research groups, MediGRID, Textgrid, GWDG, during the Pre-D-Grid phase 2004
- periodic meetings start shortly after D-Grid kickoff
- several tutorials for scientists of the region were organized
- first joined application for resources within BMBF Sonderinvestitionen 2006
- the extension of high energy physics in Göttingen leads to the join of a further community to GoeGrid with significant higher demand of resources in the middle of 2007.

objectives of GoeGrid

- GoeGrid is a joint grid resource center in Göttingen.
- The partners of GoeGrid are research groups with grid related activities.
- All partners are jointly involved in funding, administrating and using the resources.
- GoeGrid organizes common grid activities like seminars, tutorials and practicals.
- The interdisciplinary use of grid resources and the integration of these resources in Germany's national D-Grid infrastructure and the WLCG project result in great advantages regarding acquisition costs, operating expenses and resource utilization.

partner, projects

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- The **MediGrid** project uses grid computing for biomedical research, image processing, and clinical research. The project is coordinated from Göttingen.

- **Textgrid**: Text sciences research analyzes the genesis of literature and their contexts. The goal of the TextGrid project is to enable eScience methods for text scientists. The project is coordinated from Göttingen.

- **particle group of the physics department** The high energy physics (WLCG, HEP) community makes extensive use of world wide available grid computing. group is member and tier-2 center of the international ATLAS collaboration

- **theory group of the physics department** Its solid state physics group uses state-of-the-art computer algorithms, like quantum Monte Carlo or renormalization group schemes.

- The **GWDG** is the location of the GoeGrid resource center. The GWDG maintains the Globus and Unicore middleware, the DGI-infrastructure, the hardware of GoeGrid and the network and other infrastructure,

administrative structure, activities

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due to the amount of resources involved in GoeGrid and to the
quality demands implied by the certification for a tier-2 center
by WLCG, it was necessary to give GoeGrid a more formal
structure.

- technical board: meetings monthly, operational issues
- executive board: meets on demand: more political
  questions
- mailing lists: intern, teaching
- activities
  - operating the resources
  - teaching: interdisciplinary seminars and practicals in turn to
    educate student, how to use grid techniques in daily work
  - coordination of common interests in the grid

concept of operation

- operational constrains
  - specification of d-grid: reference installation
  - specification of WLCG (Worldwide LHC Computing Grid Project):
  - demands of local user
- Middleware
  - Globus TK 4.0
  - gLite
  - Unicore 5
- user administration
  - UID regions
  - Pool-Accounts for WLCG - gLite
  - static Homes for D-Grid
  - VO-management and AA from D-Grid
- Monitoring: Grid (MDS) and local Ganglia implementations

access to the queuing system PBS
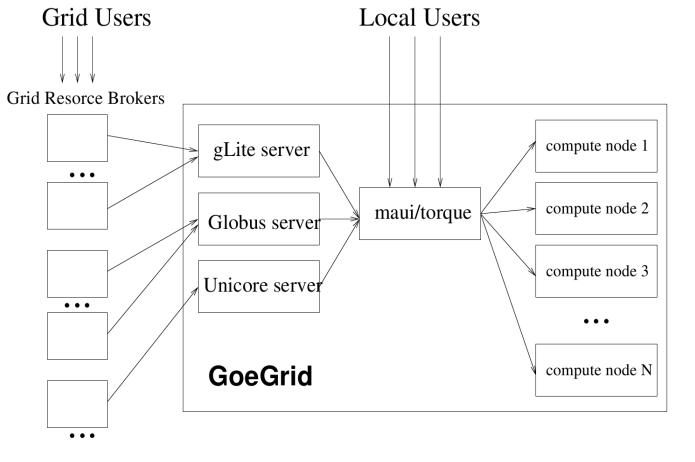
- job submission locally and/or by all middlewares
- PBS manages the job queues and the compute resources

queuing system: scheduler maui

- maintains 'up to date' job and node information.
- determines submission priorities and backfill
- fairshare for governing
- proportionate usage corresponding to the financial investment
- group target as goal
- group and user priorities are all equal at the moment, but can be adjusted by the executive board (group-pr ¿¿ user-pr)
- weighted use: usage of the last 14 days, decay factor 0.8 for each 2 days gone
- formula:

$$Priority \sim \sum_i SubcompWeight_i * DeltaSubcomp_i$$

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utilization

*** PBS Per-Group Usage Report (January 2009) ***

Group	Jobs	Wall(h)	Aver. (h)	Aver. CPU	Sum Wall(h)
astrogrid	7355	133330.7	18.1	1.0	133330.7
dgtest	19	0.0	0.0	1.0	0.0
dteam	375	6.5	0.0	1.0	6.5
kerndgrid	38	0.0	0.0	1.0	0.0
medigrid	82222	125105.3	1.5	1.0	125105.3
atlas	2755	8753.4	3.1	1.0	8753.4
atlasde	3	5.3	1.7	1.0	5.3
atlasprd	25489	72066.0	2.8	1.0	72066.0
atlassgm	390	34.5	0.0	1.0	34.5
opssgm	786	18.3	0.0	1.0	18.3
ph1	72	3095.9	42.9	13.0	50132.8
theorie	28543	476350.6	16.6	1.0	638998.5

remember the goal

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Group	cores		perc goal	Jan2008
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TextGrid	7x8=	56	3.3	0
HEP Grid	32x8=	256	15.2	0
Sum D-Grid		676	40.1	25.7
LCG,atlas	48x16=	768	45.6	7.8
physics	30x8=	240	14.3	66.4
Total Sum		1684	100.	100.

accumulated CPU-h:

- D-Grid: 267201.2
- Atlas: 80872.2
- Physik: 689131.3
- total: 1037204.7

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problems of the integration

- the mapping of users to userids is static for D-Grid (gridmap-file, VO pools)
- this amount of UIDs is significant (more than 4000 now)
- one has to think about UID ranges for the different user groups anyway
- gLite and Atlas:
  - user pool account mapping, home dirs by automounter
  - all data removed after job finishes
  - no data sharing possible, and not necessary for atlas user
  - not D-Grid compatible (availability of data after job ends)
  - Atlas/WLCG user do not belong to D-Grid
  - even the HEP group in Göttingen does not belong to HEP-Grid
  - therefore D-Grid accounting covers only a part of grid usage
  - but mayor parts of the cluster is funded by BMBF (D-Grid)
- the users of the physics department can not use grid accounts

Integration of general resources of the computer center

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- requirements:
    - users have to belong to VOs or communities
    - VOs or communities have to fit into the financing structure
- advantages:
    - resources of the computer center and of d-grid could be presented in a unified way
    - common administration
    - load balancing
    - extended user community
    - new ways of financing

outlook
OptiNum-Grid

OptiNum-Grid

- will be a new community in D-Grid, coordinated from Göttingen.
- objective: numerical simulation of technical and scientific systems in a grid
  - integrated circuits
  - several scientific codes
  - development of a user interface
- coverage of a mayor part of the computing demands of GWDG
- OptiNum can build the basis for the extension of the grid usage across all computing intensive user groups of GWDG.

Questions ??
Thank You !!