What is Grid Computing?

Grid computing uses the resources of many separate computers connected by a network (usually the internet) to solve large-scale computation problems.
Grid computing offers a model for solving massive computational problems by making use of the distributed resources (computing power, storage capacity or data algorithms) of large numbers of disparate, often desktop, computers treated as a virtual cluster embedded in a distributed telecommunication infrastructure. Grid computing focuses on the ability to support computation across administrative domains, which sets it apart from traditional computer clusters or traditional distributed computing.

Grids offer a way to solve grand challenge problems like protein folding, financial modeling, earthquake simulation, climate/-weather modeling an others found in Biomedical Informatics. They also provide means for offering information technology as a utility bureau for commercial and non-commercial clients, with those clients paying only for the resources they actually use, as with electricity or water. Grid computing has the design goal of solving problems too big for any single supercomputer, whilst retaining the flexibility to work on multiple smaller problems. Thus Grid computing provides a multi-user environment. Its secondary aims are: better exploitation of the available computing power, and catering for the intermittent demands of large computational exercises.
This implies the use of secure authorization techniques to allow remote users to access computing resources.
Grid computing involves sharing heterogeneous resources (based on different platforms, hardware/software architectures, and computer languages), located in different places belonging to different administrative domains over a network using open standards. In short, it involves virtualizing computing resources.
Grid computing is often confused with cluster computing. The key difference is the resources which comprise the grid are not all within the same administrative domain.

Functionally, one can classify grids into several types:

- Computational Grids (including CPU scavenging grids), which focuses primarily on computationally-intensive operations.
- Data grids, or the controlled sharing and management of large amounts of distributed data.
- Equipment Grids which have a primary piece of equipment e.g. a telescope, and where the surrounding Grid is used to control the equipment remotely and to analyze the data produced.
- Semantic Grids which contain complex, heterogeneous data types.

Source: partially Wikipedia.org

The MediGRID Consortium

MediGRID is realized in a consortium with eight partners.

Spokesperson: Otto Rienhoff
University Göttingen, Head of Department of Medical Informatics
haegar@med.uni-goettingen.de

Module A: Coordination
Telematikplattform for Medical Research Networks (TMF e.V.)
medigrid@tmf-ev.de
Sebastian C. Semler, Mathias Blaurock, Stefan Scholz

Module B: Ontology tools
University Leipzig
rahm@informatik.uni-leipzig.de
Markus Löffler, Erhard Rahm, Toralf Kirsten,
Michael Hartung, Katrin Loebe

Module C: Resource fusion
Konrad-Zuse-Institute, Berlin
steinke@zib.de
Thomas Steinke, Ralph Müller-Pfefferkorn, Ulrich Schwardmann

Module D: Middleware
Fraunhofer-Gesellschaft IAO / FIRST, Stuttgart
anette.weisbecker@iao.fraunhofer.de
Anette Weisbecker, Jürgen Falkner, Thilo Ernst

Module E: Bioinformatics
Uniklinikum Schleswig-Holstein, Kiel
jhampe@1med.uni-kiel.de
Jochen Hampe, Tobias A. Knoch, Burkhard Morgenstern, M. Schroeder

Module F: Image Processing
Charité, University Medicine Berlin
dagmar.krefting@charite.de
Dagmar Krefting, Thomas Tolxdorff, Michael Vossberg

Module G: Clinical Research
University Marburg
penzel@med.uni-marburg.de
Thomas Penzel, Richard Dodel, Wolfgang Oertel, Sebastian Canisius

Module H: eScience
University Göttingen, Department of Medical Informatics
usax@med.uni-goettingen.de
Ulrich Sax, Yassene Mohammed

Website: **http://www.medigrid.de**
Application portal: **https://portal.medigrid.de**

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MediGRID

Development of a Grid Infrastructure for the Medical and Life Sciences

D-GRiD

– A Project of the D-GRiD Group –

Sponsored by

Federal Ministry of Education and Research

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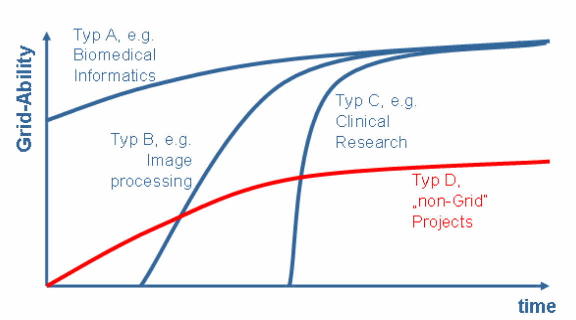
The MediGRID-Project

Grid computing is regarded as one of the critical success factors in biomedical Research. The joint project MediGRID unifies well known research institutes in the area of medicine, biomedical informatics and life sciences into a consortium. Numerous associated partners from industry, healthcare and research facilities ensure a broad representation of these communities.
The main goal of MediGRID is the Development of a **Grid middleware integration platform** enabling eScience services for biomedical life science. Therefore the consortium allocated the tasks in different modules. The four methodological modules (middleware, ontology, resource fusion and eScience) plan to incrementally develop and provide a Grid infrastructure while taking into account the need of the biomedical users. The user communities are represented in three research modules for biomedical informatics, image processing and clinical research.
MediGRID is initially funded until 2008. Within this time period our goal is to demonstrate the benefit of Grid computing in use cases covering different areas of biomedical informatics.



Type-A projects (s. figure) can start immediately; they are prepared for Grid computing. Other projects can be "gridified" using the experience of the first projects (type B and C). Projects of the type D should be avoided. The idea behind is to increase the slope of the learning curve (pipelining).

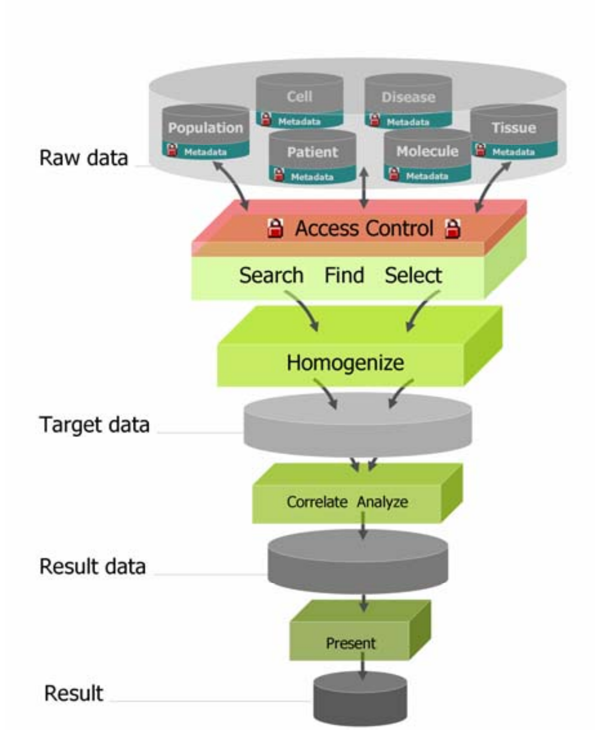
The first applications in image processing, ontology tools and bio-medical informatics are incorporated in our portal and can be called up:

https://portal.medigrid.de

We are member of HealthGrid.Org and organized a workshop during the AMIA 2006 in Washington, D.C. (USA). We hope to improve our services through international cooperation with project like caBIG.

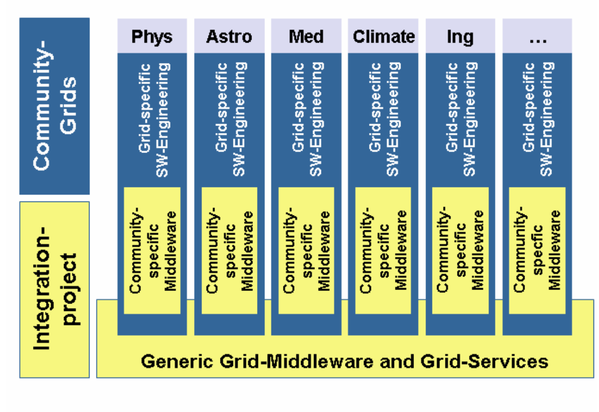
From Raw Data to Research Results

Whereas Grid projects are pretty similar in the lower layers, the biomedical community has to face particular challenges in the upper layers. The top layer represents the heterogeneous biomedical data sources. Beyond the problem to find the relevant data sets via metadata description, access control to the data is of paramount interest, as the owner of the data are foremost patients. Due to the heterogeneity of the data we need an additional ontology layer to homogenize the data. Given semantic interoperability the researcher can correlate and analyze the data with biomedical informatics methods. Finally the result data can be presented.



MediGRID is Part of the D-GRiD-Group

Under the roof of the D-GRiD initiative the German Federal Ministry of Education and Research (BMBF) is funding additional Grid projects e.g. for astronomy, climate research, high-energy physics and engineering science.
The D-GRiD integration project coordinates the activities of the individual community projects using synergies to create and consolidate a Grid platform for the German research community.



You can find further information about D-GRiD and the related community projects on

www.d-grid.de