# Perspectives of Grids and e-Science in Germany

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A German Grid Initiative

- Kickoff workshop in February 2003 (Wissenschaftszentrum Bonn)

- Initially driven by the research centers of the Helmholtz association and the DFN-Verein

- Open to all interested partners, in academia and industry

- Strategic program paper will be written until summer
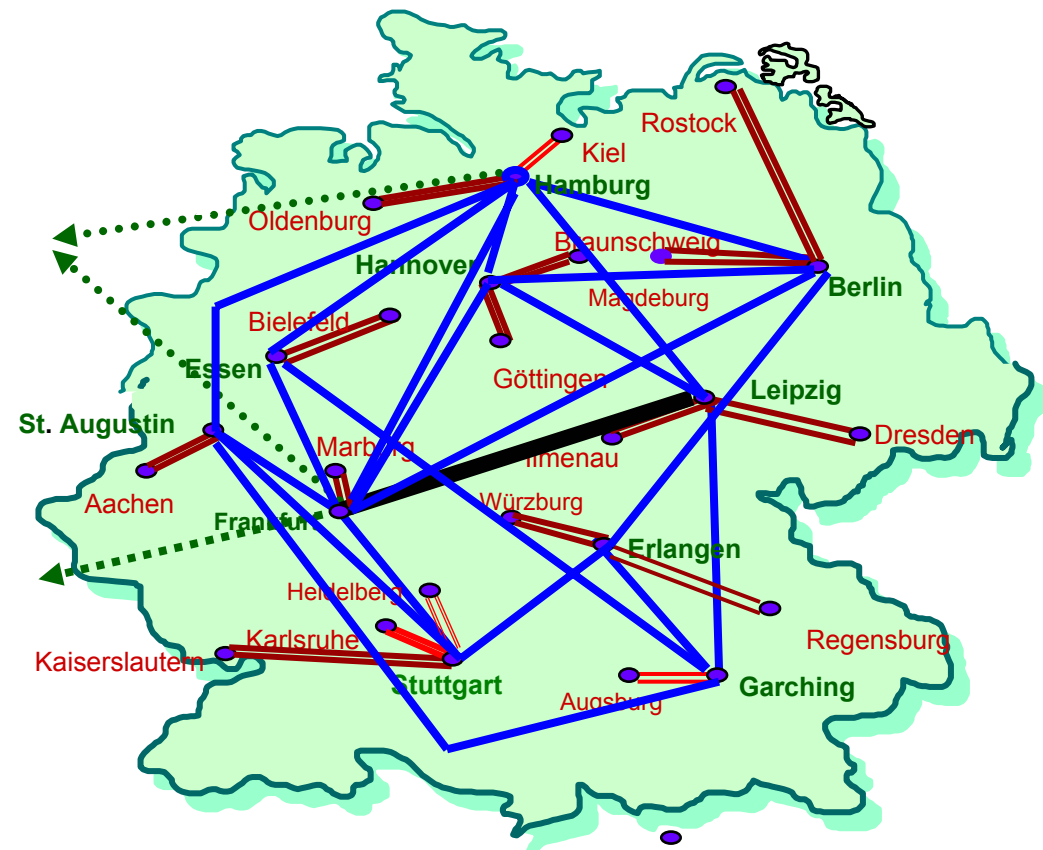
10 Gbit/s
2,4 Gbit/s
1 Gbit/s
622 Mbit/s

Strategic Considerations

- ◆ Development of a common Grid infrastructure to integrate resources for **science and industry**
  - ▪ Standardization of interfaces and components
  - ▪ Implementation of backbone network with non-trivial QoS

- ◆ Deployment of a network of competence and coordination centers for Grid computing
  - ▪ Deployment of Middleware and Dissemination via Grid User Support Centres

- ◆ Implementation of generic and prototyping Grid applications
  - ▪ E-Science applications
  - ▪ E-Business models
  - ▪ Development of programming models, tools and application specific middleware for dynamic, scalable, autonomous and secure Grid applications

- ◆ Development of problem solving environments for e-Science
  - ▪ Applicable in Science, Economy, Culture and Education
  - ▪ Knowledge based systems
  - ▪ Besides technical and scientific knowledge: Integration of economic knowledge
  - ▪ Work with unreliable sources and missing values

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Building Grids: Technical Challenges

◆ **Building a Grid among friends**

   ▪ All sites deploying similar hardware

   ▪ Long history of collaboration among principals

   ▪ System design not expected to scale to millions of participants

◆ **Running a general public production Grid for eInfrastructure**

   ▪ System must be bullet-proof, useful, usable

   ▪ **Heterogeneity** in community and hardware, design *must* scale

   ▪ **Heterogeneity** in programming models
     (real-time, on-demand, adaptive, etc.)

   ▪ Provide programming environments and tools

      • *How do we debug a Grid program?*

Building an international eInfrastructure

◆ **Logistical Challenges**

  ▪ Software maintenance

  ▪ Accounting and billing over multiple administrative domains

  ▪ Resource co-allocation over multiple sites

◆ **Legal Challenges**

  ▪ Deal with varying institutional policies, open source policies, licensing policies, etc.

◆ **Ideological Challenges**

  ▪ Organizational framework to promote development of stable, persistent infrastructure

  ▪ Commercial vs. academic community – should someone make a profit?

  ▪ Shared/private, free/charged for, centralized/distributed

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Building an international eInfrastructure

- ◆ **Political Challenges**
    - ▪ Integration of different cultures wrt administration of resources, operations, SW development and deployment
    - ▪ Global management of resources in a secure and dependable way
    - ▪ Decision making and **enforcing**
    - ▪ Mechanisms to select and support applications (equity)
    - ▪ Ensure stable, persistent, long-term, adequate funding