



Grid Computing in Switzerland

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What is Grid Computing?



Definitions

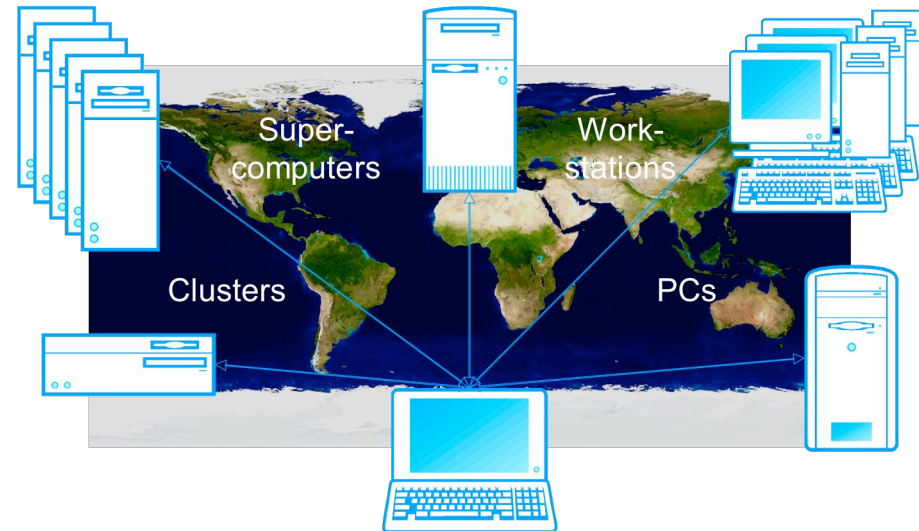
- “A computational grid is a **hardware and software infrastructure that provides dependable, consistent, pervasive, and inexpensive access to high-end computational capabilities.**” (Foster/Kesselman 1998/99)
- “... **coordinated resource sharing and problem solving in dynamic, multi-institutional virtual organizations.**” (Foster/Kesselman/Tuecke 2001)
- “... a Grid is a system that: **coordinates resources that are not subject to centralized control ... using standard, open, general-purpose protocols and interfaces ... to deliver nontrivial qualities of service ...**” (Foster 2002)

History

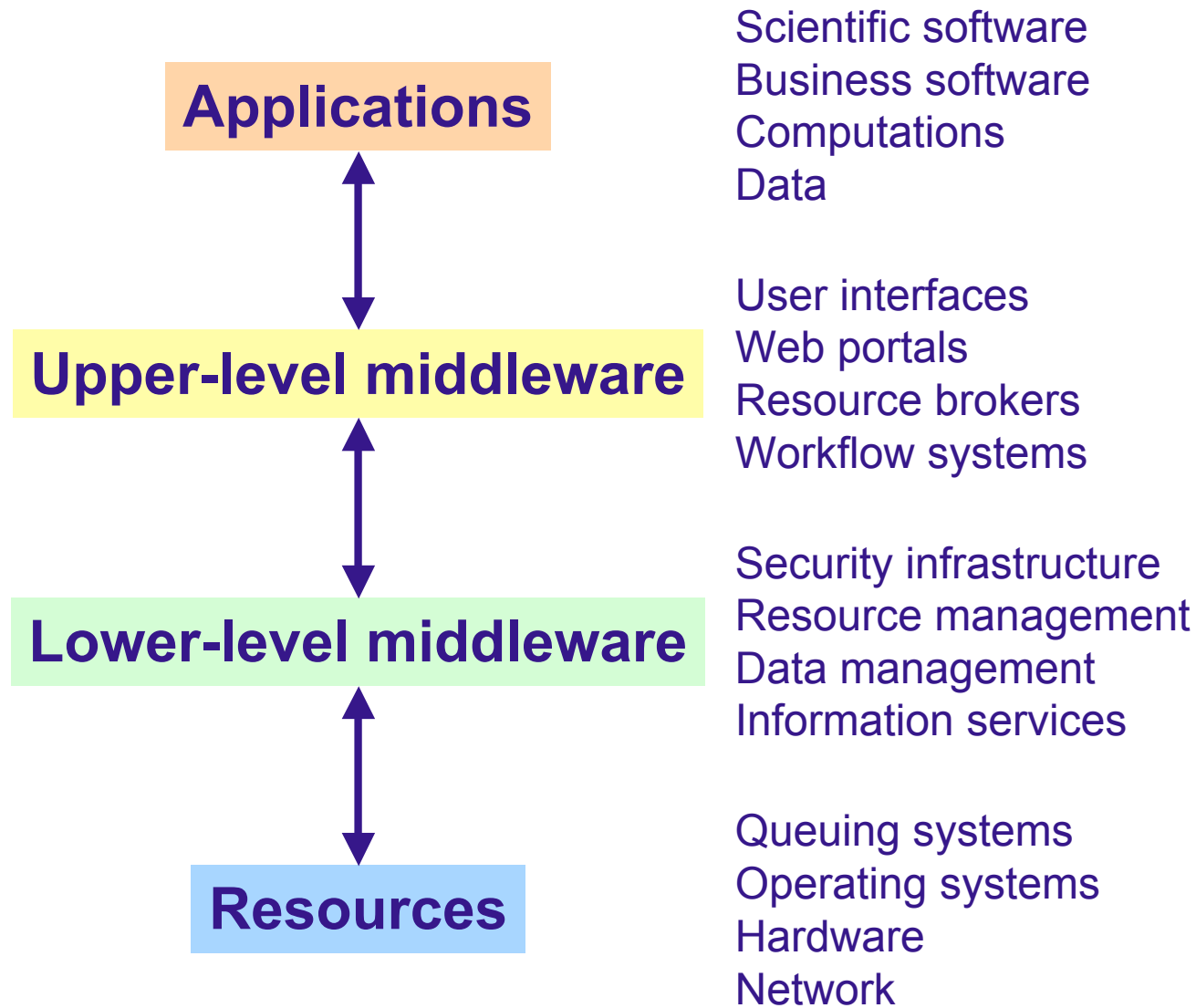
- Electrical power Grids
- Internet
- SETI@home
- ...

Types

- Computational Grids
- Data Grids
- Desktop Grids
- Sensor Grids
- ...



Grid Infrastructure Layers



Usage of Grid Computing



Application areas

- Physics
- Chemistry
- Life sciences
- Medicine
- Engineering
- Earth sciences
- Finance
- Computer science
- ...

Technologies

- Embarrassingly parallel calculations
- High-throughput computing
- Data analysis
- Data management
- Distributed systems
- Virtualization
- Workflows
- ...

Opportunities

- Availability and flexibility
- Performance and scalability
- Throughput and capacity
- Automation
- Efficiency and cost
- Access to resources
- Fairness and collaboration
- Interdisciplinarity
- Knowledge exchange and dissemination

Challenges

- Heterogeneity and complexity
- Transparency for the user
- Loose network coupling
- Distribution algorithms
- Application porting and deployment
- Meta-scheduling and brokering
- Legacy codes
- Policy, trust and security issues
- Standardization
- Funding and implementation

Grid Projects in Switzerland



Local Projects

- Middleware: JOpera at USI/ETHZ, OSIRIS at UniBas, XtremWeb-CH at HES-SO, ...
- Infrastructure: Greedy Pool at EPFL, PC Grid at UniBas, ...

International projects

- EU: Chemomentum, CoreGRID, DEGREE, DILIGENT, EGEE-II, EMBRACE, KnowARC, GRIDCHEM, PRACE, ...
- Multinational: PRAGMA, SEPAC, ...

National projects

- Intelligent Scheduler System (ISS)
- Swiss Bio Grid (SBG)
- **Swiss National Grid Association (SwiNG)**
- ➔ National Grid Initiative (NGI) within the European Grid Initiative (EGI)

SwiNG mission statement

- Ensure **competitiveness of Swiss science**, education and industry by creating value through **resource sharing**.
- Establish and coordinate a sustainable **Swiss Grid infrastructure**, which is a dynamic network of resources across different locations and administrative domains.
- Provide a **platform for interdisciplinary collaboration** to leverage the Swiss Grid activities, supporting end-users, researchers, industry, education centers, resource providers.
- **Represent the interests of the national Grid community** towards other national and international bodies.

Organisational Structure of SwiNG



Member Institutions

- Berner Fachhochschule
- École Polytechnique Fédérale de Lausanne
- Eidgenössische Technische Hochschule Zürich
- ETH Research Institutions (EAWAG, EMPA, PSI, WSL)
- Fachhochschule Nordwestschweiz
- Haute École Spécialisée de Suisse Occidentale
- Hochschule Luzern
- Friedrich Miescher Institute
- Scuola Universitaria Professionale della Svizzera Italiana
- Swiss Institute of Bioinformatics
- Swiss National Supercomputing Centre
- SWITCH
- Università della Svizzera Italiana
- Universität Basel
- Universität Bern
- Universität Zürich
- Université de Genève
- Université de Lausanne
- Université de Neuchâtel

Assembly

- 19 member institutions
- Main ruling body

Scientific Council

- 20 member groups
- Scientific and technical advice

Executive Board

- 3-7 members
- Day-to-day operation

Working Groups

- **ATLAS:** Particle physics
- **Proteomics:** Life science
- **Infrastructure & Basic Grid Services:** Grid architecture, operation, and data management
- **Grid Workflows** (in preparation)
- **Education & Training** (in preparation)
- **Industry Relations** (in preparation)

Participation

- Register as a member group
- Propose a working group
- SwiNG will try to coordinate projects
- More information at <http://www.swing-grid.ch/>