



IST-2001-32133

GridLab - A Grid Application Toolkit and Testbed

## D13.9 Exploitation Plan

---

Author(s):	Jarek Nabrzyski
Document Filename:	
Work package:	WP13 Dissemination
Partner(s):	The GridLab Consortium
Lead Partner:	Poznan Supercomputing and Networking Center
Config ID:	GridLab-13-D13.9-0004-0.9
Document classification:	INTERNAL

---

**Abstract:** In this document we present the way in which the GridLab software will be used and exploited during the last year of the project as well as after the project.



---

Last amendment date: 2004/01/16 & time: 10:30:00

## Contents

<b>1</b>	<b>Introduction</b>	<b>2</b>
1.1	Purpose of Document . . . . .	2
1.2	General Dissemination/Exploitation Activities of the GridLab Project . . . . .	2
1.2.1	International Organizations . . . . .	2
1.2.2	Major Grid Research Projects . . . . .	3
1.2.3	Application Communities. . . . .	3
1.2.4	Publications, Presentations, Demonstrations and Training . . . . .	4
1.2.5	GridLab Testbed and Interoperability with Other Testbeds . . . . .	5
1.2.6	Cooperation with National Grid Initiatives in the Participants' Countries.	5
1.2.7	Commercial Support . . . . .	5
<b>2</b>	<b>The GridLab Exploitation Plan</b>	<b>5</b>
2.1	Dissemination/Exploitation by Industrial Partners . . . . .	8
2.2	Dissemination/Exploitation by Individual Academic Partners . . . . .	10
<b>3</b>	<b>Summary</b>	<b>13</b>

## 1 Introduction

### 1.1 Purpose of Document

GridLab has many complex components, and although it is designed, developed, and tested primarily in the EU, it is essential that there be a very strong coupling to other major Grid projects, especially those in the US where Grid technologies are more mature and European Gridstart projects, especially those, who have shown their interest in GAT and GridLab Services. The purpose of this document is to describe how GridLab partners will exploit the results of the project during the last year of the project as well as after the project.

### 1.2 General Dissemination/Exploitation Activities of the GridLab Project

The GridLab project will demonstrate how widely distributed computing facilities and other scientific devices (for example a gravitational wave detector) can be exploited in a coherent and integrated way for demanding scientific and engineering applications. Principle outcomes of this work will be to provide *(i)* the Grid Application Toolkit (GAT), *(ii)* seed applications, *in use* across different application communities, and *(iii)* a large experience and quality code base that will be used by commercial organizations as a foundation for extending GridLab results into industrial quality products, which support and exploit the emerging Grid computing environment.

Through a number of activities, described below, GridLab will be highly connected to a number of other major Grid projects, who will work collectively with each other, through the Global Grid Forum, and with industry to develop appropriate standards for interoperability of Grid services to be developed. All the project partners are committed to the widespread dissemination and active exploitation of the results of the project, implemented by the comprehensive dissemination and exploitation activities of Work Package WP13. GridLab is planning to undertake numerous activities to ensure the wide dissemination and exploitation of the work of the project:

#### 1.2.1 International Organizations

GridLab will play a prominent role, with many of its members already active participants (at a senior management level), in international standardization bodies and dissemination entities, including the European Grid Forum and Global Grid Forum (GGF). Jarek Nabrzyski (GridLab Project Manager), Alexander Reinefeld, Edward Seidel, Giovanni Aloisio, Thilo Kielmann (WP leaders) and others have been instrumental in driving these organizations to merge into a world-wide GGF. Nabrzyski was a Program Chair of the GGF1 meeting held in Amsterdam in March 2001. Standardization of and wide dissemination/adoption of the results of the GridLab project will be possible within the industrial and scientific communities through work within the GGF. Specific activities will include:

- GGF Application Working Group (AWG). GridLab member Seidel is co-chair of the AWG, which brings together a wide spectrum of Grid application and infrastructure developers 3 times per year. The GridLab project will feature prominently in the AWG, and its group members (outside GridLab) will be involved in using or providing input into its deliverables.

- GGF Advanced Programming Models (APM) and Grid Computing Environments (GCE). GridLab members are extremely active in these groups. APM aims to develop appropriate programming models and API's of broad applicability across the Grid. The Grid Application Toolkit (GAT) development will be carried out in consultation with the APM. GCE looks at the environments necessary for effective use of a Grid. The GridLab portal and GATs will be discussed extensively in this group, and adapted as needed for effective adoption by the community.

### 1.2.2 Major Grid Research Projects

Many GridLab members are already very active in other Grid projects, such as these listed below. GridLab itself has also established formal collaborations with some of these projects. Through these connections, GridLab components will be well known to, where possible interoperable with, and where appropriate will be used by, nearly all other major Grid projects. Connections are particularly strong with some groups, into which GridLab components will be disseminated, including:

- Globus development teams in USA (at ANL and ISI) are already very closely working with GridLab members, and have established formal ties to the GridLab project.
- Condor is being developed in conjunction with Cactus and GridLab for high throughput computing and resource brokering, and hence GridLab components will be propagated to the Condor user community.
- GrADS is a major US-based Grid application development system funded by NSF. There are very strong ties between GridLab members and GrADS, and Cactus is already used as the primary application driver. This connection will strengthen, as several GrADS participants have pledged to work with GridLab to co-develop various components.
- GriPhyN is one of the largest Grid projects, funded in the US, and there are several ties with GridLab. Not only are there strong collaborations between key GriPhyN personnel (Foster, Kesselman) in computation, but also project leader Paul Avery has agreed to serve on GridLab's advisory board. Further, there are strong scientific links between GridLab and GriPhyN due to the gravitational wave astronomy component (GriPhyN members Bruce Allen, Scott Koranda, and Manuela Campanelli are close colleagues of the AEI and Cardiff groups). GriPhyN has already started to use GRMS for workflow management and Triana for workflow composition.
- The Astrophysical Simulation Collaboratory (ASC) project, funded by the NSF, aims to bring advanced computation infrastructure, including Cactus and a Grid Portal, to a broad astrophysics community. Seidel is a PI in this project; GridLab and the ASC plan use each other's work in mutual projects.
- GriKSL was a German project, led by GridLab members Allen and Seidel, that develops related I/O and Cactus infrastructure that will be used by GridLab. GridLab components will then be used in GriKSL and likely propagated to other DFN projects.

### 1.2.3 Application Communities.

GridLab Tools will be developed in conjunction with several targeted application communities from the outset, leading to immediate benefit for a number of application users. These projects

will provide extensive testing of software on varied international testbeds, and will ensure ultimate usability and interoperability, and will then be propagated to other communities. Key application communities already planning to use GridLab include:

- The Numerical Relativity Group at AEI, led by Seidel, and its collaborators worldwide, have been the primary application group behind Cactus and associated technologies for years, and will be immediately and deeply involved as userbase for GridLab.
- The EU Network for Gravitational Wave Sources, led by Seidel, consists of ten EU institutes doing research in computational astrophysics.
- The Astrophysics Simulation Collaboratory (ASC), has a growing international userbase, and with the recent addition of Mike Norman's Zeus code for astrophysical MHD, has several hundred users worldwide. This community will be automatically Grid enabled through the Cactus GAT.
- Triana and the Gravitational Wave Community, led by Schutz at AEI and Cardiff, consists of a large userbase of dozens of researchers across Europe, and through collaborations with LIGO and the GriPhyN project, GridLab technologies will be used in these communities in the US.
- NASA Grand Challenge projects in the US in astrophysics (Seidel is a PI) are using Cactus, and climate modeling and geosciences are beginning to do so, too, leading to a large userbase for GridLab in other communities.
- METACHEM a consortium for computational chemistry led by Reinefeld at ZIB, will make use of technologies developed by GridLab.
- NCSA Alliance Users in the US already use Cactus and its distributed computing technologies, and GridLab technologies will be used directly in the newly proposed Distributed Terascale Facility at NCSA and SDSC, if that project is funded.
- Globus and Condor user communities, through associations with GridLab will use GridLab technologies as they are deployed.

#### 1.2.4 Publications, Presentations, Demonstrations and Training

Dissemination of research and development throughout the course of the project will be carried out through publication in technical and scientific journals and presentations at conferences, including the Global Grid Forum (GGF) tri-yearly meetings and its working groups, High Performance Distributed Computing (HPDC), Supercomputing Conferences. The GridLab members also have a long history of high profile demonstrations of their emerging technologies at such meetings, often in partnership with major centers such as NCSA, ANL, or with vendors such as SGI, Sun, and others. GridLab components will also be presented and demonstrated at various important discipline specific meetings, including General Relativity (GR) and Marcel Grossmann meetings, American Physical and Astronomical Societies, etc. Training on GridLab systems will be carried out at these meetings, and at meeting of the application communities discussed above, as it has for Cactus in the past.

### 1.2.5 GridLab Testbed and Interoperability with Other Testbeds

The operation of a high profile Grid testbed in Europe during the course of the project will be very influential in disseminating GridLab components to other testbeds worldwide, as we have agreements with other testbed operations in the US e.g. the GrADS, Alliance, ASC testbeds to make our testbeds interoperable. The testbeds are expected to continue, and become production environments, after the completion of the project. The testbeds and GridLab components will be made available to third parties for short periods for specific demonstrations related to Computational and Data Grids and the exploitation of high performance networks.

### 1.2.6 Cooperation with National Grid Initiatives in the Participants' Countries.

GridLab project will play an important role in providing technology to be exploited in national grid initiatives and in coordinating an international infrastructure to allow the local facilities to be integrated on a European scale, as discussed below e.g. the Polish PIONIER.

### 1.2.7 Commercial Support

The middleware technology developed within the project, including any application specific middleware extensions, will be done in an open environment - in the sense that the partners will not retain the intellectual property rights. Furthermore, SUNSUN and HPCCF will put the produced software in their Open Software repositories, assuring its quality. The open approach will ensure that the results of the project are freely available for commercial exploitation by other organizations. The industrial partners in this project have all accepted this working scenario and will adapt their business model to it. Also, Microsoft is genuinely very interesting in supporting high performance computing e.g. they sponsored the 4th Grid Forum meeting, and is already an active source of funding for Cactus as a research project. Through this relationship Microsoft is highly aware of and interested in the GridLab project, which may bring about other commercial applications.

## 2 The GridLab Exploitation Plan

Through a number of activities, described below, GridLab will strengthen its high connection to a number of other major Grid projects, who will work collectively with each other, through the Global Grid Forum, and with industry and through the Global Grid Application Alliance to develop appropriate standards for interoperability of developed Grid services and tools. The following actions will be taken to ensure as global as possible usage of GridLab tools:

- **Collaboration with Unicore and with Intel.** We have already started a collaboration with Unicore. Right now the Unicore group is developing, with its own resources but through extensive meetings with GridLab, the GAT Unicore adaptors. This will enable a broad Unicore community to use the GAT and GridLab services. In this way we will also be able to proof the infrastructure independence of the GAT-enabled applications.
- **Collaboration with DataGrid/EGEE and other 6th Framework projects.** GridLab is already collaborating with the DataGrid project and we also talk with The EGEE management to include our work in their future developments. Several meetings took already place and we investigate whether we are able to satisfy the needs of the application

communities of these projects, based on the HEPICAL documents. Farther steps towards this collaboration will be taken. GridLab already works with both individual communities' resources and intra-European Grid projects, including DEISA, HPC Europa, and EGEE for testing and widespread deployment. GridLab endeavors not to duplicate or reproduce other technologies developed in Europe or elsewhere, but to develop common interfaces to the best tools and services developed everywhere. One of its fundamental premises is that tools and applications should be *infrastructure independent*, and hence GridLab is designed from the ground up to make use of many other national and international research activities in related areas.

- **Strengthen Collaboration with US partners.** To ensure the tightest connection to related US based projects, and to accelerate usage of the GAT and GridLab services, we will work directly with three leading US groups, led by Ian Foster, Carl Kesselman, and Miron Livny, who are the primary developers and world experts in certain key technologies on which we base our work and who also contribute to our developments as subcontractors. We will work into the direction of using Grid Technology Repository run by Globus Team as one of the repositories through which the GridLab software is distributed.
- **Formation of the Global Grid Application Alliance.** To exploit synergies and avoid duplication, communities in different application domains having similar requirements will join forces and share common layers. We will coordinate activities that build critical mass, avoid duplication of efforts and strengthen European leadership in developing the next generation Grid technologies. A major strength of GridLab is its international collaboration with complementary research communities and programmes. We think about building such an Alliance by coordination of three independent Alliances: European Grid Application Alliance, which can be build using the Gridstart Application TWG, American Grid Application Alliance, to be led by LSU and Ed Seidel, and Asia-Pacific Grid Application Alliance to be led by Satoshi Matsuoka and Satoshi Sekigucci. First, initial organizational meeting did already take place and first actions were taken. Such an worldwide alliance of strategically connected partners, from both Industry and Research will allow GridLab's achievements span across the worldwide grid application communities. The project will have very broad international impact, as it has assembled a strategic global alliance of externally funded application-oriented partners from academia and industry, that will all use the same high level toolkits to Grid-enable existing applications, and just as importantly, to develop a new generation of innovative applications which truly take advantage of the new possibilities which grids provide. Importantly, researchers from these research groups and others, as well as from numerous vendors worldwide, are participating in a Global Grid Forum activity designed to produce standard APIs for application level access to various Grid services. This partnership, and the activities it touches, has the potential to create tools that not only revolutionize applications across the world, but also standard application level interfaces to them that are universally adopted and deployed. GridLab and its international partnership will have profound impact, by creating a simplified and standard programming interface for applications and tools alike, creating new generations of applications that are interoperable, enabling distributed communities to work together, and infrastructure independent, allowing the applications to function in any environment they find themselves.
- **Collaboration with Gridstart projects.** In GridLab, we delivered a vision of how Grid applications will operate in the future, and developed a set of generic problem solving tools and services that bring this vision a large step closer to fruition. We prototyped this vi-

sion with real, production level applications that were developed alongside our tools and services. Most prominent among the tools for building and interacting with future applications on the Grid are the Grid Application Toolkit (GAT), GridSphere Portal Framework, GRMS, Mercury Monitoring System to name just a few. Not only have these tools formed the cornerstone of the GridLab project, they are in the process of being adopted by a large international community. The GAT has become the focal point of the GridStart Applications Working Group, spanning 20 Grid projects in Europe, and has spawned activities in the GGF aimed at standardizing application level APIs for accessing Grid services. GRMS is now being considered and tested by the Canadian Grid project. This collaboration will further be strengthened. We see GRidstart project as one of the most important ones that could foster the exploitation of the results by our strong involvement in this project. And we are involved from the very beginning. Ed Seidel (AEI) and Peter Kacsuk (SZ-TAKI) have recently become co-chairs of the Application Technical Working Group, Jarek Nabrzyski (PSNC), the project leader, has become a co-chair of the Grid Resource Management and Scheduling Working Group, Ludek Matyska (MU) and Peter Kacsuk (SZTAKI) are co-chairs of the Performance Analysis and Grid Monitoring Technical Working Group, Florian Schintke (ZIB) is a co-chair of the Data Management TWG.

- **Strong Deployment Activities.** Working with a broadly representative set of application communities, we will deploy these techniques to solve complex problems in areas of special importance in the EU. The application areas will be carefully selected to maximize the impact of this project, while also providing broad feedback to the research component to make our tools practical and enabling for generic applications.

Application communities will be strategically chosen in areas where Europe is already strong or leads, such as gravitational wave research or avalanche modeling, or where it has serious needs. Some European research in Grid technologies, especially application oriented areas, also leads the world. European groups were early to recognize and develop a collaborative, application oriented approach to Grid computing, resulting in such tools as Cactus, Triana, and the Grid Application Toolkit. The impact of this project will be very tangible, and very significant, as it develops Europe's lead in Grid application technologies, and applies them to solve European problems, while exporting them to the rest of the world.

- **Contribution to Standards.**

An important and crucial result of the work carried out within the GridLab project is that the Grid Application Toolkit (GAT) has now entered the standardization process of the Global Grid Forum. At GGF9, held in Chicago in October 2003, a Grid-API (GAPI) Working Group BOF was held, seeking to coordinate the community efforts for GAT standardization. The BOF was organized by GridLab members following overwhelming demand for such an application-oriented API at meetings and workshops of the GGF Application Research Group, meeting of the EU Grid projects, and during discussions with many computational scientists in Europe and the world.

The Grid-API BOF was well attended and supported (with around 70 participants), and all signs indicate that a Grid-API Working Group will be approved by the GGF Steering Committee by the end of October 2003. One chair of the Working Group will be a GridLab member.

The roadmap for the Working Group effort includes three stages:

1. survey of application use cases and scenarios

2. definition of capabilities of the G-API
3. language specific specifications of the G-API

These stages reflect the GAT specification process in GridLab, and will build on its results. Due to that preparatory work from GridLab the standardization process should be significantly shorter than usual, and the Working Group is aiming to finalize the Grid-API in well under two years. Please note that recently the name of the group has been changed to SAGE (Simple API for Grid Enabling)

The GridLab project will continue to actively contribute to the Grid-API standardization, and take over the leading role of GridLab in that process.

For middleware development, the Matrix community will provide active input to the GGF standardization process wherever appropriate. This affects various aspects as security, data transport, replica management, network management, resource management, and monitoring in Grid environments. Here is a list of GridLab persons chairing various working groups:

- Alexander Reinefeld and Martin Walker are sitting at the GGF Advisory Committee
  - Jarek Nabrzyski is a co-chair of the Grid Scheduling Architecture Research Group.
  - Ed Seidel and Thilo Kielmann are co-chairs of the Grid Applications and Testbeds Research Group.
  - Andre Merzky is a co-chair of Data Management Working Group
  - Thilo Kielmann is a co-chair of the Chackpoint and Recovery Working Group
  - Dave Angulo is a co-chair of Life Sciences Grid Research Group
  - Susanne Balle is a co-chair of User Program Development Tools For the Grid Research Group
  - Ian Taylor is a co-chair of the Appliance Aggregation Architecture Research Group
- **Adoption of Standards.** The flexibility of the GAT with respect to the utilization of underlying Grid middleware environments allows dynamical adaption to new environments and new standards as they arise. This was one of the design goals of the GAT, and provides future proof solutions for the target applications. The success of this approach has been proven by the ability of the GAT architecture to include both OGSA and Unicore middleware environments.

As described above, the GridLab project will continue to ongoing standardization efforts. Hence, the adaptation of any resulting standards is of mutual interest to the project and to GGF, as it is ensured that the standards serve the needs of the GridLab community, and as the success of the GGF standards is measured by their acceptance in the Grid community.

## 2.1 Dissemination/Exploitation by Industrial Partners

**Sun Microsystems GmbH** In July 2000, Sun Microsystems acquired Gridware GmbH, a private developer and vendor of Distributed Resource Management (DRM) software tools, and spin-off of Genias Software GmbH. For Sun Microsystems as a provider of industrial-strength hardware, software and services this acquisition facilitates the deployment of compute farms, thus the adoption of the Grid Computing model.

From its beginnings SUN has been emphasizing on resource management for clustered computers in intranets, extranets, and in the Internet. Sun Microsystems develops Grid Engine, an advanced DRM tool designed to aggregate compute resources, match them to individual job requirements, and deliver network-wide compute power to the desktop. Sun Grid Engine has become open source software, end of July 2001.

In GridLab, Sun Microsystems GmbH will be responsible for the provision and further development of the basic resource management technology. Also, SUN will take care of the widest-possible distribution and usage in the Computing Grid Community of the outcome of GridLab.

Sun Microsystems GmbH' mission is to help customers by creating new technology which then becomes widely accepted, implemented, shared and used. SUN's software technology enables ease of portability, programmability and use, and is more and more free and open source.

This similarity to software being developed during the course of research projects, makes it easy for SUN to collaborate with research and to help provide the results then back to the software and computing community.

Thus, a natural dissemination and exploitation contribution for SUN within the GridLab project consists of:

- inviting GridLab partners to Sun Microsystem SUN GmbH' exhibition activities to present the GridLab results in SUN's booths to the visitors of the exhibitions
- demonstrating the GridLab results in Sun Microsystems iForce Center located in the head-quarter and in Sun Microsystems' subsidiaries all over the world

A prerequisite to achieve this is a high-quality outcome of the GridLab project. Thus, Sun is helping in testing and evaluating the GridLab environment to ensure high quality of the final results of the GridLab project.

**HPs** vision *Everything to the Internet* is embedded in their corporate culture. The Internet is about information. The Grid is about knowledge. HPCCF is already a leading supplier of infrastructure for the Grid, for example, the Terascale Computing System at Pittsburgh Supercomputing Center, the world's most powerful computer system for non-military computational science.

HPCCF's products span the whole range of information technology, from hand-held computers to supercomputers. In particular, the iPAQ Pocket PC is the most powerful hand-held computer available today. The idea to use an iPAQ Pocket PC to launch, monitor, and steer technical applications on supercomputers is powerful and seductive. The GridLab project includes work to make this idea real.

HPCCF itself runs a project on mobile computing, within which it is investigating the future of handheld computing.

The participation of HPCCF in the GridLab project will be mainly focused on attacking the issues of Pervasive Wireless Computing, with seamless, secure, ubiquitous access to any users' information at any time and from anywhere. New software extensions needed for Grid application steering will be developed for the Mercury BackPAQ prototype device. The software for mobile Grid computing will be put into the HPCCF Open Source repository, and information on mobile Grid computing extensions will be distributed to the iPAQ Linux community.

HPCCF will also publicize innovative integrated solutions resulting from the GridLab project and deliver them through HPCCF's world-wide presence.

Most important statement has been made recently by HPCCF. HPCCF will investigate and work with GridLab project in order to include GridLab tools and services as part of their Grid Resource Toolkit (GRT), which is now in the process of defining. GRT will be offered to global HP customers who want to deploy a grid infrastructure.

## 2.2 Dissemination/Exploitation by Individual Academic Partners

All academic partners involved in GridLab have considerable experience of pan-European and international dissemination. The results of the GridLab Project will also be presented by each partner in numerous national forums within each host country, as well as in international conferences, workshops and seminars. Technology demonstrations will be given at many international meetings, such as Supercomputing, HPCN, HPDC, GGF, and other big events in the Grid computing world. Particular contributions of the some of the participating institutions are highlighted below:

**PSNC** is the main institution behind the national IST and GRID-related program, “PIONIER — Polish Optical Internet, Applications, Technologies and Tools” funded by the Polish Parliament for 2001–2005. PIONIER relies on forming an advanced infrastructure, with tools, services and applications available for the entire scientific community, government, local administrations and finally the whole society. The outcomes of the GridLab project will be used in the PIONIER project to foster the realization of the program.

PSNC organizes the Grid-related conference (“PIONIER - Polish Optical Internet, Technologies Services and Applications”) every year in April, where the results of the project will be disseminated. Moreover, PSNC will probably co-organize one of the “GRID” conferences.

As co-founder and national representative of the EU COST initiative METACHEM (Metaboratories for Computationally Complex Applications in Chemistry) PSNC will push the exploitation of GridLab results for the establishment of a metacomputer infrastructure for computational chemistry in Europe.

Most important decision has been recently made by PSNC management to fund a special team, 6-8 full time equivalents, to produce a **GridSuit** based on the GridLab technologies. The suit will be open source but a support will be charged. The boxed solution will also be produced for commercial customers who want to deploy a grid infrastructure and grid-enable their applications. Special care will be taken to integrate the software taking into account the commercial needs of potential customers.

PSNC will deploy GridLab software in the national grid infrastructure, especially in projects like:

- **CLUSTERIX**. National Cluster of Linux Systems. Clusterix will provide commercial grid capabilities for money.
- **Progress**. The main goal of this project is to create an environment providing access to computational applications, which will be run in a cluster consisted of several SUN computers. Name of the project - PROGRESS - is an acronym of full project name i.e. “Polish Research on Grid Environment for SUN Servers”. Realization of tasks connected with this project has started in December 2001. Scientific research and development were completed in May 2003. For period from June to October 2003 is devoted to deployment of the production system for the Life Sciences applications. PSNC will integrate GRMS with Progress’ Resource Broker.

**AEI** is an active and influential member of numerous large scale international collaborations, involving both application users and computational infrastructure development. It is the lead institution in Cactus, the DFN-Verein funded GriKSL project, the GEO600 Gravitational Wave Observatory, the EU Astrophysics Network project, the Applications Working group of the GGF, and participates very actively in the US-based GrADS, Globus, ASC, NASA Grand Challenge, and NCSA Alliance projects. It also has an extremely active visitor program where visitors in the relativity and computing worlds are exposed to its research projects.

**Masaryk University** and its Institute of Computer Science are active leaders in Grid computing initiatives within the Czech Republic and MU has led several projects within the framework of “High speed national research network and its new applications”, a large program supported by the Czech Republic (with Luděk Matyska as program deputy co-ordinator).

MU hosts a national centre of excellence for a computational chemistry, which has strong interest in use of Grid toolkits. The Institute of Computer Science is also involved in projects on the development of the infrastructure for health-care specialists, where the use of Grid technology is planned. GridLab results will be made directly available to these Czech research communities.

**ZIB** participates in several metacomputing projects where the results of GridLab will play an important role in the creation and implementation of super-national grid environments. ZIB collaborates with the chemical e.g. Norsk Hydro and pharmaceutical e.g. Lion Bioscience, Novo Nordisk, Merck, Novartis industries. All face similar problems, namely the user-friendly access of geographically dispersed compute servers and the scheduling of coupled applications that run on different systems at the same time. The data management software that will be developed in the GridLab project is expected to solve some of the most pressing problems. As co-founder and national representative of METACHEM, ZIB will push the exploitation of GridLab results to establish a metacomputer infrastructure for computational chemistry in Europe.

ZIB will deploy part of GridLab software in the national grid infrastructure.

**MTA SZTAKI** already participates in Grid projects both in Hungary and internationally. MTA SZTAKI started the first Hungarian project with the goal of Grid enabling the P-GRADE parallel programming environment. MTA SZTAKI also participates in the second Hungarian Grid project in testing and adapting Globus and Condor. MTA SZTAKI plans to start new Grid projects where the results of the GridLab project will be disseminated and directly used. MTA SZTAKI participates in the performance monitoring section of the DataGrid project. Prof. Kacsuk of MTA SZTAKI is the leader of the Grid Monitoring package of the APART-2 project starting in Summer 2001. Involvement in these projects and in the GridLab project will enable the mutual dissemination of results and avoid duplication of efforts. As co-founder and national representative of METACHEM, MTA SZTAKI will push the exploitation of GridLab results to establish a metacomputer infrastructure for computational chemistry in Europe.

MTA SZTAKI will deploy GridLab software in the national grid infrastructure.

**The ISUFI/High Performance Computing Center (ISUFI/HPCC)** in Lecce is devoted to advanced research in the area of High Performance, Distributed and Grid Computing, and has a high visibility both at international and national levels. It is affiliated with the US-based NPACI, and has official cooperation agreements with the Italian Space Agency (ASI) and Caltech, in particular with the Center for Advanced Computing Research (CACR). It is strongly involved in Grid research projects in different application contexts (remote sensing, medical imaging, air quality forecast models), and the tools and software developed in GridLab will be brought into these and other application contexts. HPCC also coordinates the activities of the national ISUFI's PHD program in high performance computing, and hence the GridLab project will have a direct impact on the education of advanced students. It is also very active in

organizing conferences and workshops, such as the EuroGlobus Workshop, which will highlight results of the GridLab project.

**National Technical University of Athens (NUTA)** activities are widely seen in the south-east of Europe with good links to the middle-east. It is particularly well connected to industry, working with numerous small and medium enterprises (SMEs), bringing them to the modern Internet market. GridLab results will be brought immediately to industry in Greece through these connections.

PSNC has expertise in Grid resource management and brokering, and Grid security, and has a research focus on knowledge-based multiobjective scheduling and resource management systems for Computational Grids. PSNC will be responsible for the work packages covering security, resource management and the overall project management.

ZIB's grid oriented research activities focus on user-friendly access to high-performance computers, and on collaborative and data intensive Visualization environments. ZIB is responsible for data handling and visualization.

HPCCF supports with its particular experience in the domain of mobile devices.

MTA SZTAKI is the Computer and Automation Research Institute of the Hungarian Academy of Sciences, specializing in Grid monitoring middleware and tools for grid computing. SZTAKI will be responsible for Monitoring.

The VU Amsterdam has many years of research experience in parallel and distributed systems. Current research focuses on distributed systems (Globe) and grid projects (Albatross, MagPIe, and Manta). VU is responsible for Adaptive Application Components.

The University of Lecce performs advanced research in High Performance and Distributed Computing and Parallel Software Engineering. It has great experience with Grid information services and resource brokering, and is responsible for Information Services.

Sun Microsystems GmbH will provide its expertise in dissemination and quality control, and will distribute the software resulting in the GridLab project to the world wide community.

### 3 Summary

All the project partners are committed to the widespread dissemination and active exploitation of the results of the project, implemented by the comprehensive dissemination and exploitation activities of the project. However already today we have to realize that GridLab's standardization process and exploitation too, will be long and painful, going much further beyond the project's funded period. These facts, and also the new ideas that GridLab partners have after two years' experience with building Grid middleware, tools and testbeds and finally, enabling the applications on the grid show that there is a strong need for the continuation of the project, after GridLab is finished. This is why already today we state hereafter, that we will come up with a followup proposal in the 2005 IST call.