

PartnerGrid

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Cooperative grid solutions for industrial applications

<http://www.partnergrid.de>

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Grid for cooperations in industry

Industrial design and production processes are increasingly based on the division of labour. By reducing in-house production depth, companies can concentrate on their core competencies and reduce their costs. Grid and cloud computing infrastructures allow companies to increase flexibility in capacity planning by adding on-demand resources.

The PartnerGrid project develops a cooperation platform that simplifies the use of these technologies. It targets small and medium sized enterprises that neither want to develop their own, complex IT infrastructure nor want to operate it on a long-term basis. Innovative scenarios from the fields of foundry technology and mechanical deformation show the usage and benefit of the PartnerGrid platform.

Mechanical Deformation Scenario

The cooperative planning of manufacturing processes in the metal-processing industry is addressed in one scenario.

Partner in this scenario is the computation service provider GNS which carries out crash and deformation simulations in the automotive field.

Supporting activities in the product development process, such as project support, the presentation of results or technical discussions, usually take place on-site at the customer's location. The software platform in PartnerGrid makes it possible for customers from medium sized companies to participate in these activities via the Internet by using grid-based technologies.

The following two use cases will be realised:

- **"Project handling between the ordering party, supplier and service provider"**: A platform for project handling between the ordering party, supplier and service provider will make project handling more efficient and reducing project management costs.

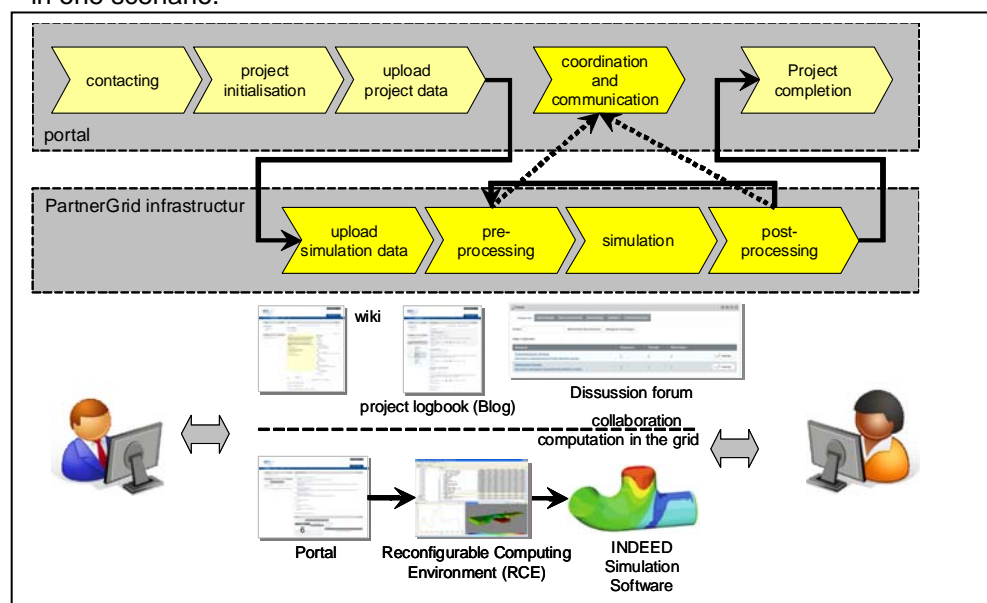


Figure 1: PartnerGrid Project Cooperation Platform



PartnerGrid

- **"Provisioning of computing resources and consulting":** Provisioning of computing resources and online consulting based on the needs of customers with the aim of making better use of hardware and software resources and expanding the offerings of GNS in the field of services and consulting.

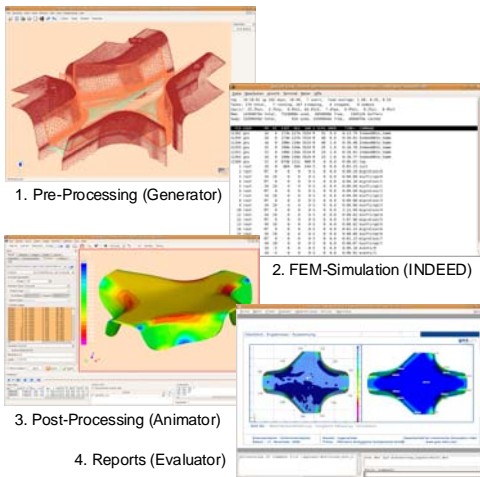


Figure 2: Workflow for numerical computations

In the casting scenario, three use cases are realised, each of which uses grid services in a different way and requires its own business model:

- **Optimisation use case:** Design optimisation of casting processes using parallel computations on distributed grid resources.
- **Enterprise scenario use case:** Use of grid computing for cross-location utilisation of optimisation applications within a company.
- **SaaS use case:** MAGMASOFT users use external hardware, software and license resources supplied by a single service provider (MAGMA GmbH).



Figure 3: Optimisation of casting process

Foundry Technology Scenario

In the foundry technology scenario, an ordering party cooperates with a foundry in the design and configuration process of casting components. The project partner MAGMA uses casting simulations to improve casting processes starting from the development of casting components, up to their manufacturing and end use. Optimisation processes in casting are based on a range of individual simulation runs whose computing time can each be up to a few days. This makes it necessary to efficiently use all available resources and to provide them to the parties involved in the design process via grid technology.

PartnerGrid: Software Platform

The software platform developed by the participating technology partners (the Fraunhofer Institutes SCAI, IAO and ITWM and the DLR) on the basis of the infrastructure and services of the D-Grid consist of a number of components:

- **A collaboration platform** (integrated into the virtual organisations of the D-Grid via VOMRS) based on portal technology with secure, certificate-based authentication and an RCE interface for triggering grid-based calculations.

- The **Reconfigurable Computing Environment** which acts as an integration platform to provide the following services: data management with version control and an OGSA-DAI interface, workflow management and a grid connection via the Grid Application Toolkit (GAT).
- The **Xen-based XenBEE** virtualisation solution with which virtual computers are used for job management by bundling commercial software packages directly with the operating system and all necessary components in a hard disk image.

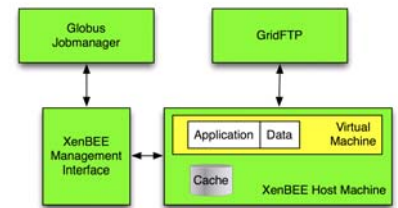


Figure 4: XenBEE for an easy application deployment

- The **GenLM licence** management solution which is based on mobile licences and allows software licences to be used by any resource provider in any grid or computing environment.

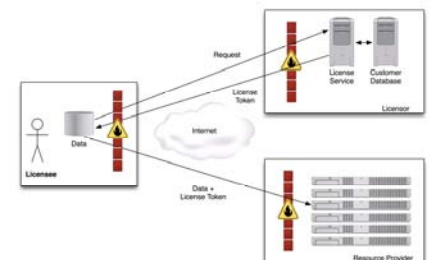


Figure 5: GenLM licence management

The developments in PartnerGrid close the gap between generic services at grid level and companies' need for a flexible, application-oriented software environment with a comprehensive range of functions.