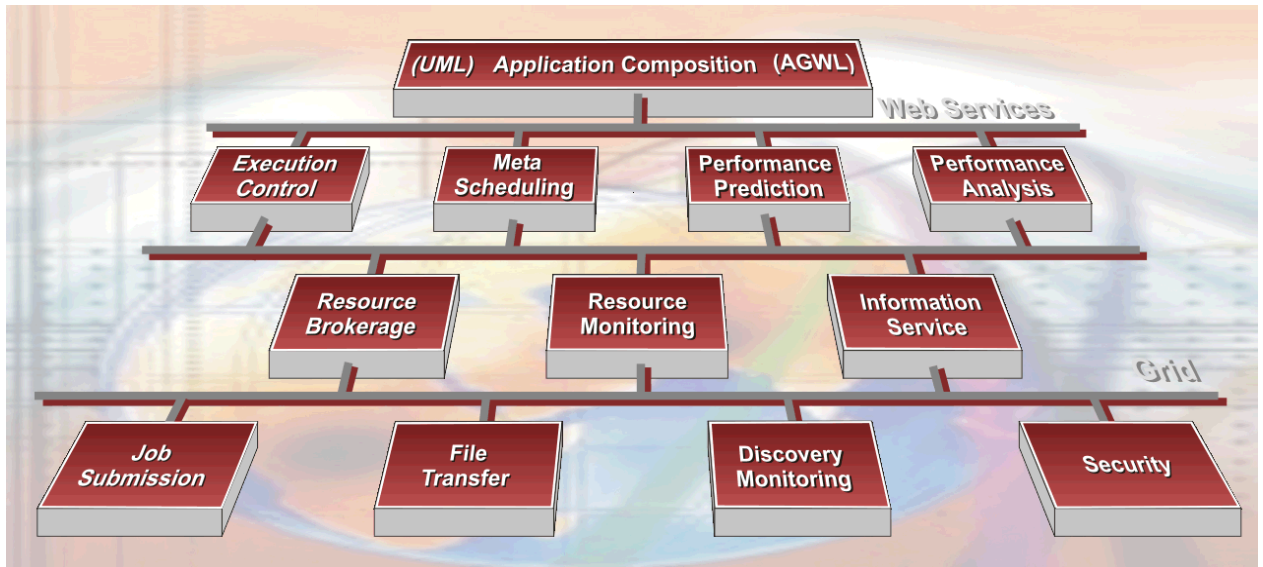




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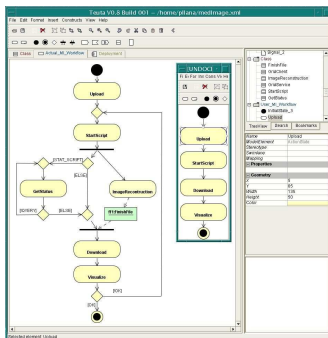
Grid Application Development and Computing Environment

The goal of ASKALON is to simplify the development and optimization of applications that can harness the power of Grid computing. The ASKALON project crafts a novel environment based on new innovative tools, services, and methodologies to make Grid application development and optimization for real applications an everyday practice.

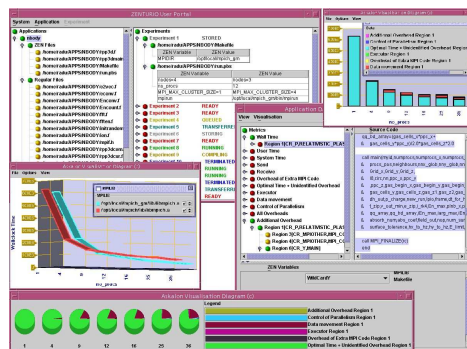


Askalon Grid architecture

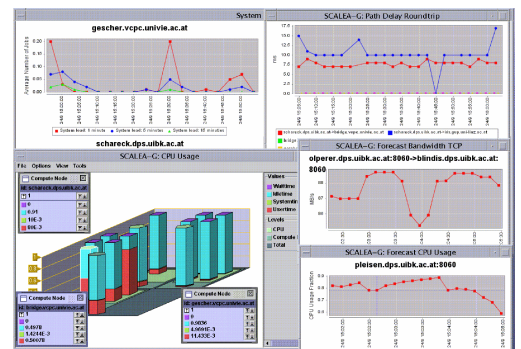
Application Composition (UML)



User Portal



Performance Analysis



Objectives:

- ✦ Invisible Grid for the End User and Application Developer
- ✦ Support for Workflow Applications and Parameter Studies
- ✦ High Level Application Modelling instead of Programming
- ✦ Generic Optimization of Applications based on Performance and Cost Constraints
- ✦ Advanced Middleware Services based on Genetic Algorithms, Ontologies and Semantic Web Technologies
- ✦ Automatic Prediction and Interpretation of Grid behavior
- ✦ Automatic Search for Performance Problems
- ✦ Fault Detection and Management
- ✦ Resource Accounting and Pricing
- ✦ Experiment Management and Control

Features and Technology:

- ✦ Service Oriented Architecture
- ✦ User Access Portal
- ✦ UML Workflow Editor (Teuta)
- ✦ XML workflow representation (AGWL)
- ✦ Customizable online visualization
- ✦ Web Services and WSRF
- ✦ X509 certificates support
- ✦ Globus Middleware
- ✦ Commodity of the Grid (CoG) – based access

Contact:

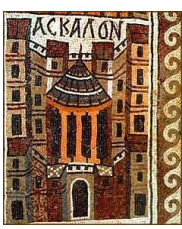
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Project Participation:



Funded by:





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Grid Application Development and Computing Environment

Grid computing enables the virtualization of distributed and heterogeneous resources such as computers, storage systems, sensor networks, instruments, and people in a seamless web of computing and distributed intelligence that can be used as a problem-solving resource in many fields of human endeavor, particularly for science and engineering.

The development of applications for computational Grids is complicated by the heterogeneity and frequently dynamic behavior of the underlying resources, by the complexity of the underlying middleware and the applications itself. Programs that execute on the Grid commonly reflect some of this complexity. To unleash the power of current Grid infrastructures requires sophisticated software tools and programming environments.

The goal of the Askalon Grid application development and computing environment is to simplify the development and optimization of applications that can harness the power of Grid computing in the same way that the World Wide Web simplified information sharing over the Internet. This will require research in several key areas, each validated in a system for real applications running on a widely distributed computing environment:

- **Graphical user interface based on UML** to enable modelling of Grid applications at a high level of abstraction instead of complex and error-prone low level programming.
- **Abstract Grid Workflow Language (AGWL)** for describing Grid workflow applications at a high level of abstraction without dealing with the complexity of the Grid or any specific implementation technology such as Web services.
- **Meta-scheduling** of distributed applications based on genetic algorithms that optimize the execution of workflow applications based on performance, cost, and QoS constraints.
- **Execution Control Services** that bridge the gap between high level application description and low level details of the underlying Grid middleware with sophisticated support for fault tolerance of Grid infrastructures and applications.
- **Resource Management** that renders the boundaries of resource brokerage, virtual organization wide authorization, advanced reservation, and co-allocation based on a Grid resource ontology and semantic Web technologies.
- **Performance Measurement, Monitoring and Analysis** that comprises dynamic instrumentation and monitoring of performance and fault behavior. Major advances are embodied to enable the automatic search for performance problems and faults in Grid infrastructures and applications.
- **Performance Prediction Services** that estimate the performance behavior of Grid applications for different infrastructures and problem sizes.

A team of 18 researchers from the Distributed and Parallel Systems Group led by Thomas Fahringer at the Institute of Computer Science, University of Innsbruck, Austria is conducting the research that crafts the Askalon Grid application development and computing environment. We are working closely with a large number of collaborators from industry and academia to leverage Grid computing for real world application development in many areas including applied numerical simulations, astrophysics, environmental applications, finance modelling, high-energy physics, meteorology and geophysics, material science, and medical sciences. The research on Askalon is partially funded by several national and international projects including the SFB Aurora, Austrian Grid project, EU EGEE Integrated Project (Enabling Grids for E-Science), EU KWF-Grid STREP project (Knowledge-based Workflow Systems for Grid Applications), and EU ASG (Adaptive Services Grid) Integrated Project. Askalon is fostering research, education, and technology transfer programs that are contributing to evolutionary new ways of utilizing the global information infrastructure as a platform for computation, changing the way scientists and engineers solve their everyday problems.

Project Participation:



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