

Software Helps Improve Software

IT at KIT: Engineering Approach to Sustainable and Dependable Software Systems/
PALLADIO Software Simulator Analyzes Programs Prior to Implementation



Using the PALLADIO simulation tool, programmers check the layout of their software before expensive implementations are made. (Photo: S.Fries/pixelio.de)

The earlier a problem is detected, the easier it can be solved. Before implementing complex programs in a time-consuming process, computer scientists also want to know whether they will reach the desired performance. Apart from own experience, developers can now rely on the PALLADIO simulation tool. The software package initiated and coordinated by Professor Ralf Reussner, KIT, analyzes the program structure in advance and prognosticates the need for resources and limitations.

“In the beginning was our observation that software developers apply a trial-and-error process. This is a rather inefficient method to produce error-free software,” says Professor Ralf Reussner from Karlsruhe Institute of Technology. He compares this process with the construction of a bridge: “If you want to build a bridge, you do not simply place a stone on top of a stone, let a truck drive across, and hope that the bridge will survive the load.” Instead, simulation programs calculate the statics and design and provide architects

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and engineers with dependable framework conditions.

This engineering approach has now been transferred to software technology by Reussner's team of researchers. The result is the PALLADIO open source software package and an additional counseling package for industry partners. The project is named after the architect Andrea Palladio, who created a new building style in Renaissance by combining esthetics with functions. PALLADIO is designed to support programmers in the development of dependable, sustainable, and complex software. Analysis of the software architecture yields findings relating to non-functional properties, such as performance, reliability, maintainability, and costs. In addition, workflows in the components and subcomponents, scalability, use of resources, and distribution aspects of the software are disclosed. The complete layout of the software is checked before "building" is started.

PALLADIO is run in a model-based manner. Instead of implementing a software system in a trial-and-error process and finding limitations, PALLADIO helps detect and prevent in advance on the model level potential limitations, such as bottlenecks or load and elasticity problems. Expensive implementations of meaningless software designs are prevented.

Manifold possibilities of using PALLADIO in practice make the software simulator interesting for industry and economy using complex software systems or in applications with high quality requirements. Enterprises with a complex IT structure in particular are given the possibility of improving their quality assurance and enhancing the efficiency of generating performant and reliable software.

In a number of projects to counsel industry, the affiliated Research Center for Information Technology (FZI) has already succeeded in improving quality and enhancing planning security by PALLADIO. This is of particular importance to critical software systems of enterprises. "At the moment, we are preparing PALLADIO for simulating the integration of the software inventory and cloud computing, i.e. the so-called hybrid cloud computing," says FZI Department Manager Dr. Klaus Krogmann. "In this way, we can combine cloud performance with the existing stock of software."

The development team of PALLADIO consists of experts from KIT,

FZI, and the University of Paderborn. By combining their efforts, the three research partners are able to rapidly respond to new research problems, such as the quality of virtualized cloud applications.

More information on PALLADIO can be found at:

www.palladio-simulator.com

IT at KIT: This Year's Highlights

At the CeBIT in Hanover on March 6, 2012, KIT will present current research from its focuses COMMputation as well as Anthropomatics and Robotics (hall 9, stand G33). Information technology will also be in the focus of KIT's annual reception on March 22, to which numerous partners from industry and science have been invited. The first German department of informatics will celebrate its 40th anniversary at KIT in autumn.

Information technology at Karlsruhe Institute of Technology is bundled into two focuses. The KIT COMMputation Focus integrates communication and computation for development of devices with capabilities to interact, to perceive their environment, and to adapt to dynamically changing requirements. Researchers from the fields of informatics, electrical engineering, information technology, and economics cooperate to develop new concepts, architectures, methods, tools, and applications for the relevant complex systems.

The KIT Anthropomatics and Robotics Focus intends to improve the quality of life of humans. Using methods of informatics, mechanical engineering, electrical engineering, information technology, social sciences, and humanities, symbiotic systems are developed after the models of human anatomy, motor functions, perception, and behavior. The research topics range from machine intelligence, human-centered robotics, multimodal interaction and robot technology through to industrial robotics.

Karlsruhe Institute of Technology (KIT) is a public corporation according to the legislation of the state of Baden-Württemberg. It fulfills the mission of a university and the mission of a national research center of the Helmholtz Association. KIT focuses on a knowledge triangle that links the tasks of research, teaching, and innovation.

This press release is available on the internet at www.kit.edu.