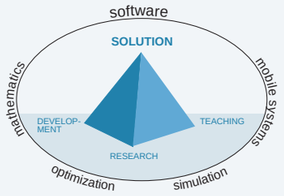
Industrial Application

RISC pursues industrial software development in cooperation with national and international companies.

The RISC Software Company founded by the RISC institute and now owned by the Johannes Kepler University employs more than 25 software developers. It offers its customers innovative software solutions in the following areas:

- Analysis and Simulation,
- Modeling and Optimization,
- Planning and Control,
- Telematics.



The RISC Software Company builds upon the expertise of the RISC institute and works in close cooperation with its members.

Initiatives

RISC has been the center of numerous scientific, educational, and industrial initiatives, such as

- the Journal of Symbolic Computation, the major scientific journal in the area of symbolic computation established by Prof. Buchberger in 1985 and published by Elsevier,
- the Softwarepark Hagenberg, an industrial park directed by Prof. Buchberger with about 35 companies and 800 employees working on software and information technology,
- the University of Applied Sciences at Hagenberg, with 9 degree programmes related to information technology and multimedia with about 1200 students, and
- the Software Competence Center Hagenberg where academic institutions and industrial enterprises cooperate in joint research and development.

Since RISC has moved to Hagenberg in 1989, the village has by these initiatives become a major economic factor in the region.

Faculty

Karoly Bosa (assistant professor)
Parallel, Distributed, Grid Computing
Bruno Buchberger (full professor, founder of RISC)
Computer Algebra, Automated Reasoning
Karoly Erdei (head of system administration)
Computer and Network Infrastructure
Ralf Hemmecke (assistant professor)
Computer Algebra
Tudor Jebelean (associate professor)
Automated Reasoning, Parallel Computing
Elena Kartaschova (associate professor)
Linear PDEs, Nonlinear PDEs, Resonances
Manuel Kauers (associate professor)
Algorithmic Combinatorics, Computer Algebra
Teimuraz Kutsia (assistant professor)
Automated Reasoning, Logic Programming
Günter Landsmann (assistant professor)
Computer Algebra, Algebraic Geometry
Franz Lichtenberger (staff scientist)
Formal Methods, Mathematics Education
Peter Paule (full professor, chairman of RISC)
Computer Algebra, Combinatorics
Veronika Pillwein (assistant professor)
Special Functions, High Order Finite Elements
Nikolaj Popov (assistant professor)
Program Verification
Heinrich Rolletschek (associate professor)
Algorithm Theory, Computability Theory
Josef Schicho (associate professor, currently on leave)
Algebraic Geometry, Computer Algebra
Carsten Schneider (associate professor)
Combinatorics, Computer Algebra
Wolfgang Schreiner (associate professor)
Formal Methods, Parallel and Distributed Computing
Wolfgang Windsteiger (assistant professor)
Automated Reasoning, Computer Algebra
Franz Winkler (full professor, vice-chairman of RISC)
Computer Algebra, Geometric Computation


Bruno Buchberger


Peter Paule


Franz Winkler

Postal Address
Research Institute for Symbolic Computation (RISC)
Johannes Kepler University
Altenbergerstraße 69 | A 4040 Linz, Austria

Visitor Address
Research Institute for Symbolic Computation (RISC)
Castle of Hagenberg, Kirchenplatz 5b
A 4232 Hagenberg im Mühlkreis, Austria

Phone: +43 732 2468 9921
Fax: +43 732 2468 9930
Email: secretary@risc.jku.at
Web: http://www.risc.jku.at

RISC
Research Institute for Symbolic Computation
www.risc.jku.at

JOHANNES KEPLER UNIVERSITÄT LINZ
Netzwerk für Forschung, Lehre und Praxis

Symbolic Computation

Symbolic computation is the subarea of mathematics and computer science

- which solves problems on symbolic objects representable on a computer (such as algebraic expressions, logical propositions, and computer programs),
- whose solutions are integrated in many advanced software systems for computer algebra, computer aided design and manufacturing, computer supported reasoning, knowledge management, and system specification and verification.

Besides playing a fundamental role within mathematics itself, symbolic computation is a key technology in many scientific and technical areas.

RISC

RISC (Research Institute for Symbolic Computation) is an institute of the Johannes Kepler University in Linz, Austria.

The institute was founded by Prof. Bruno Buchberger in 1987 and is currently chaired by Prof. Peter Paule. The faculty of RISC consists of 19 members supervising about 25 international Ph.D. students and several diploma students in mathematics and computer science. The working language of the institute is English. RISC is located in the beautifully renovated medieval castle of Hagenberg, approximately 20 km northeast of Linz.

RISC pursues research, education, and the industrial application of symbolic computation.

More than any other area, symbolic computation depends on the integration of the theoretical foundations (mathematics, logics, algorithms), the implementation in software systems, and the practical applications. RISC offers a comprehensive symbolic computation curriculum whose main goal is to unite these aspects. RISC considers research, education, and the industrial application of symbolic computation as the three facets of a „spiral of creativity“ which drive each other higher and higher.

Research

RISC is committed to excellence in research.

Within the realm of symbolic computation, research at RISC mainly falls into three general categories:

- Computer Algebra: We design and implement algorithms that operate on algebraic expressions; typical application areas are (algebraic) geometry and (algorithmic) combinatorics.
- Computational Logic: We work on the specification, management, and derivation of knowledge expressed in the language of symbolic logic (resulting in software systems for supporting mathematical proving) and on the theory of computation.
- Mathematical Software: We develop various symbolic computation software such as it occurs in computer algebra systems and theorem provers and study the logical foundations of software for the purpose of formal system specification and verification.

These categories present different views on the same subject with strong overlappings and interrelationships.

Projects and Cooperation

RISC pursues strong cooperation with the national and international scientific community.

- RISC has carried out numerous research projects with various partners supported by national and international funding agencies.
- RISC is a key participant in the Special Research Program „Numerical and Symbolic Scientific Computing” of the Austrian Science Foundation (FWF) at the JKU (chairman: Prof. Peter Paule, RISC).
- RISC has helped building up the Johann Radon Institute for Computational and Applied Mathematics (RICAM) of the Austrian Academy of Sciences.
- RISC has been a founding member of the Austrian Center for Parallel Computation (ACPC) and of the Austrian Grid (AGRID).
- RISC has organized numerous international conferences and workshops; members of RISC are regularly invited as key note speakers and members of program committees.

A report of the US science foundation NSF about RISC concluded already in 1989 „There is no comparable facility in the United States“.

Education

RISC offers a comprehensive curriculum in symbolic computation for students in mathematics or computer science.

About 25 Ph.D. students (most of them from foreign countries) and a number of M.Sc. students are pursuing their studies at RISC in an inspiring research-oriented working environment. They are integrated into various projects and work in close contact with internationally recognized researchers and with fellow students on their Ph.D. topics at the scientific forefront.

The Ph.D. program takes 3-4 years and is organized as follows:

- Training Semester: The first semester is a probation period in which the student is introduced to the main research areas of RISC.
- Course Work: During the second and third semester, the student attends courses from the RISC curriculum introducing him/her to the scientific topics pursued at RISC.
- Ph.D. Topic: After two semesters, the student agrees with a member of the RISC faculty on the supervision of a Ph.D. thesis, typically within the frame of a research project.
- Ph.D. Thesis: In the subsequent two years, the student works on the thesis under the guidance of the advisor. The thesis is finally presented and defended according to the rules of the Johannes Kepler University.

An international committee evaluating all Austrian mathematics institutes in 2005 proposed the RISC Ph.D. program as a model.