

## **Reinhard Wilhelm: CV**

(<http://rw4.cs.uni-sb.de/~wilhelm/wilhelm.html>)

### **Scientific Career**

- 1965 - 1972 Studied Mathematics, Physics, and Mathematical Logic at Westfälische Wilhelms-Universität Münster, Informatics at Technical University München and Stanford University.
- 1977 Dr. rer. nat degree from TU München
- 1978 - 2014 Full Professor of Informatics at Saarland University in Saarbrücken
- 1990-2014 Scientific Director of the Leibniz Centre for Computer Science (formerly the International Conference and Research Centre for Computer Science) Schloss Dagstuhl

### **Research Areas**

Compiler construction, static program analysis, embedded real-time systems.

### **Visiting Scientist**

University of California, Berkeley, in 1983

Hebrew University, Jerusalem, and IBM Israel Scientific Centre, Haifa, in 1986,

International Computer Science Institute, Berkeley, in 1989,

École Normale Supérieure, Paris, in 1999 and 2008,

Verimag, Grenoble, in 2008 and 2009.

### **Summary of Research Activities**

The research activities of Reinhard Wilhelm have concentrated on the following areas: Compiler design and generation, static program analysis, design and implementation of program analyses for the determination of worst-case execution times incorporating cache and pipeline behaviour predictions, design of powerful shape analyses that determine the data structures a program is manipulating, techniques to generate visualisations and animations.

### **Compiler Design and Generation**

Individual contributions concerned attribute evaluation, tree pattern matching, tree parsing, and tree transformation, code selection, instruction scheduling, and grammar flow analysis.

### **Static Worst-Case Execution-Time Analysis**

Design and implementation of sound program analyses for the determination of worst-case execution times incorporating cache and pipeline behavior predictions. This research resulted in the first set of commercial tools for the determination of worst-case execution times, developed and marketed by the spin-off company AbsInt. These tools have been used in the certification of the time-critical systems of several Airbus plane generations.

### **Design of powerful static program analyses based on 3-valued logic**

Originally, these analyses were developed to determine the data structures a program is manipulating. Later applications concerned the verification of partial correctness of sorting programs and of a mark-and-sweep garbage collector, and of synchronization properties of multi-threaded programs.

### **Publications**

Author and coauthor of several text books on Programming Languages and Compiler Construction, and on Document Processing. These books are partly translated into English and French.

Extensive publication about the results of the research in the fields listed above in journals, monographs, conference and workshop proceedings (dblp 170).

## **Community Activities**

Driving force behind the foundation of the ETAPS conference series, International Joint Conferences on Theory and Practice of Software

## **Awards and Honours**

2000 ACM Fellow

2006 Alwin Walther Medal

2007 Prix Gay-Lussac-Humboldt

2008 Honorary doctorates of RWTH Aachen and Tartu University

2010 Cross of the Order of Merit of the Federal Republic of Germany

2013 Acceptance into the German National Academy Leopoldina.

2020 Outstanding Technical Achievement and Leadership Award of the IEEE Technical Committee on Real Time Systems

2025 ACM SIGBED Technical Achievement Award

## Reinhard Wilhelm: The Ten Most important Publications:

Christian Ferdinand, Reinhold Heckmann, Marc Langenbach, Florian Martin, Michael Schmidt, Henrik Theiling, Stephan Thesing, Reinhard Wilhelm: Reliable and Precise WCET Determination for a Real-Life Processor. EMSOFT 2001: 469-485

C. Ferdinand, F. Martin, and R. Wilhelm: Applying Compiler Techniques to Cache Behavior Prediction. In Compilers and Tools for Real-Time Systems (LCT-RTS'97), 1997, *long version in* Christian Ferdinand, Florian Martin, Reinhard Wilhelm, Martin Alt: Cache: Behavior Prediction by Abstract Interpretation. Sci. Comput. Program. 35(2): 163-189 (1999)

Reinhard Wilhelm, Dieter Maurer: Übersetzerbau - Theorie, Konstruktion, Generierung, Springer 1992

Christian Ferdinand, Helmut Seidl, Reinhard Wilhelm: Tree Automata for Code Selection. Acta Inf. 31(8): 741-760 (1994)

Ulrich Möncke, Reinhard Wilhelm: Grammar Flow Analysis. Attribute Grammars, Applications and Systems 1991: 151-186

Peter Lipps, Ulrich Möncke, Matthias Olk, Reinhard Wilhelm: Attribute: (Re)evaluation in OPTRAN. Acta Inf. 26(3): 213-239 (1988)

Lothar Thiele, Reinhard Wilhelm: Design for Timing Predictability. Real-Time Systems 28(2-3): 157-177 (2004)

Reinhold Heckmann, Marc Langenbach, Stephan Thesing, Reinhard Wilhelm: The influence of processor architecture on the design and the results of WCET tools. Proceedings of the IEEE 91(7): 1038-1054 (2003)

Shmuel Sagiv, Thomas W. Reps, Reinhard Wilhelm: Solving Shape-Analysis Problems, in Languages with Destructive Updating. POPL 1996: 16-31, *long version in*

Shmuel Sagiv, Thomas W. Reps, Reinhard Wilhelm: Solving Shape-Analysis Problems in Languages with Destructive Updating. ACM Trans. Program. Lang. Syst. 20(1): 1-50 (1998)

Shmuel Sagiv, Thomas W. Reps, Reinhard Wilhelm: Parametric Shape Analysis via 3-Valued Logic. POPL 1999: 105-118 *long version in*

Shmuel Sagiv, Thomas W. Reps, Reinhard Wilhelm: Parametric shape analysis via 3-valued logic. ACM Trans. Program. Lang. Syst. 24(3): 217-298 (2002)

## **Reinhard Wilhelm Experience in Scientific Education**

**Number of Years in Faculty Position: 28**

**Number of Supervised Completed Doctoral Dissertations: 24**

**Number of Current Doctoral Students: 8**

### **List of Dissertations Supervised within the Last 5 Years**

- Carsten Görg
- Andreas Kerren
- Christian Probst
- Henrik Theiling
- Sebastian Winkel
- Jörn Schneider
- Stephan Thesing
- Peeter Laud

### **Exposure to Other Systems of Scientific Education**

- Stanford University, MS student,
- University of California, sabbatical
- Hebrew University, sabbatical
- DTU Lyngby, Teaching summer course

### **Other Relevant Experiences:**