

# Michael Sperber

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Education	Ph.D., M.S.
Citizenship	German
In computing since	1983
Working as a contractor since	2003

## 1 Mission Statement

I build software, and help my customers build software – faster and more robustly than with the processes and tools they have in place. Developing software faster means more time to focus on what matters: functionality and user experience. Developing software more robustly means fewer bugs, powerful and extensible domain models, and less time spent on refactoring or reengineering. I do this by combining the latest research on software development, specifically functional programming, with over 25 years of pragmatic experience building software in many different problem domains.

### ***Main focus***

- architecture and development of complex software
- domain-specific modelling

### ***Further areas of expertise***

- concurrent and distributed systems
- programming language design
- compiler construction
- formal methods
- multimedia programming and hardware interfacing
- modelling, valuation, and management of financial derivatives
- large-scale refactoring

### ***Training***

I can offer training in all areas of my expertise. I have extensive experience teaching at the university level, and am a recognized expert on the teaching of programming.

### ***Technical documentation***

I write comprehensive and understandable technical documentation in German and English. I am the author, co-author or editor of a large number of technical articles, scientific papers, manuals, scripts, books, and standards documents. I have been working as freelance author since 1985.

## **Presentation**

My presentations are lucid and understandable, and I draw from extensive experience giving talks at international and national scientific conferences, University lecture series, and industrial training programs, using a wide variety of techniques, among them theatrical acting and directing.

## **2 IT expertise**

### **Hardware**

PC, IBM POWER/PowerPC, Sun SPARC, Apple Mac, various microcontrollers

### **Operating Systems**

Unix (FreeBSD, Linux, Solaris, AIX, HP-UX), Mac OS X, Windows NT/2000/XP/Vista

### **Programming Languages**

(alphabetically) Assembler (x86, PowerPC, SPARC, ...), BASIC, C, C++, C#, Clojure, Common Lisp, Emacs Lisp, Erlang, F#, FORTRAN, Haskell, Java, JavaScript, Lua, Mathematica, Objective C, Objective Caml, Pascal, Perl, PL/SQL, Python, Racket, Ruby, Scala, Scheme, Smalltalk, SQL, Standard ML

### **Databases**

Oracle, SQLite, PostgreSQL, Berkeley DB, Microsoft SQL Server, MySQL

### **Web technologies**

XML, HTML, XHTML, XSLT, RDF, Ajax, SOAP

### **Revision control systems**

Subversion, darcs, CVS, Mercurial, git, MKS Source Integrity

### **Foreign languages**

native German, fluent, accent-free US English

## **3 Reference projects**

(Customer evaluations available)

### **2008-2009 TTCN-3 compiler (intaris, Freiburg)**

For intaris GmbH, I developed a compiler and run-time development for TTCN-3, a domain-specific language for writing test suites for software systems and protocols. The compiler generates C code.

(TTCN-3, Scheme, C)

### **2008-2009 Design study for a document-management system (T-Systems, Leinfelden)**

For T-Systems, I worked with the local developers to create a semantic model for the next generation of a large-scale document-management system. The model is represented by an executable specification written in Scheme. I also developed the infrastructure for the high-level query language of the system.

(Scheme, Java)

### **2008 Cashflow views (Hypo Real Estate, Stuttgart and Munich)**

I developed software for analyzing the financial-product database in HRE's Front Arena PRIME trading system. The software transforms the product data into a uniform representation and generates views on the expected cashflows.

(Windows, Python, Front Arena PRIME)

### **2007 Automation software for surface analysis (SPECS, Berlin)**

I developed an application for automating surface analysis processes. For this, I designed a domain-specific programming language for describing such processes, along with a formal model for the language. I then wrote a GUI application to create and run automation programs.

(Windows, Java, SWT, Scheme)

### **2004-2009 Insurance premium calculator (Fahrlehrerversicherung, Stuttgart)**

The premium calculator of the Fahrlehrerversicherung is a combined web/desktop application that interactively calculates premiums for various kinds of insurance (including car, accident, household, building and glass). It is being used by service representatives on their laptops and on the corporate intranet, and is also available to customers on the Internet. The project replaces several legacy applications that were very difficult to maintain. It was developed extremely rapidly, and is highly flexible.

(Windows, Mac OS X, Unix, Scheme)

### **2005-2007 Refactoring for Unicode support (T-Systems, Leinfelden)**

For T-Systems in Leinfelden, I refactored a large document-management application to support Unicode text. This activity involved creating infrastructure for representing, manipulating and encoding Unicode text, interfacing with external libraries, training of co-workers, organization of offshoring efforts, as well as coordinating the refactoring proper.

(Windows, Linux, Solaris, HP-UX, AIX, Oracle, ODBC, SQL, Lua, C++)

### **2005-2006 Equity derivatives (HSH Nordbank, Kiel)**

For HSH Nordbank in Kiel, I designed and implemented, together with targit GmbH, a new infrastructure for managing equity derivatives in Sophis Risque. This included project management, and developing new models for products, market data, and valuation, as well as infrastructure for automated testing.

(Windows, C++, SQL, Sophis Risque)

### **2004-2006 Unicode support in Scheme 48 (Basis Technology, Cambridge, US)**

For Basis Technology, I converted the Scheme 48 system to a Unicode text representation. This included extending the virtual machine, refactoring the ASCII-dependent parts of the system, latching onto the Unix/Windows text-representation infrastructure, the implementation of case folding, encoding conversion, normalization, and extending the reader.

(Windows, Unix, Scheme, C)

### **2003-2004 Equity derivatives (HypoVereinsbank, Munich)**

I wrote software for pricing and managing exotic equity derivatives for HypoVereinsbank in Munich. (The software works in conjunction with Sophis Risque.) As part of the project, I

refactored substantial parts of the historically grown code base, set up an infrastructure for regression testing, and developed algebraic models for market data, market scenarios, and financial products, as well as algorithmic optimizations for Monte Carlo pricing algorithms. I also introduced modern revision management (using the Subversion system) into the project.

(Windows, Linux, Solaris, C++, Scheme, C#, SQL, Sophis Risque)

## 4 Active projects

This list contains some of the other software projects I have worked on in recent years.

### **1994- Scheme 48**

Scheme 48 (<http://www.s48.org/>) is a development environment for the Scheme programming language that is extremely reliable as well as easy to adapt and modify. I am a core developer; in recent years, I have worked on the x86 native code compiler, the C foreign function interface, the garbage collector, the framework for concurrent programming, the Windows system interface, and Unicode support.

(Unix, Windows, C, Assembler, Scheme)

### **1995- XEmacs**

XEmacs (<http://www.xemacs.org/>) is a productivity suite based on a powerful text editor. It contains, among other modules, a source-code browser, email clients, address books, calendars, file managers and remote access. I am a core developer, and work on the Dired file manager, the EFS remote access package, the garbage collector, and many aspects of the system architecture.

(Unix, Windows, Mac OS X, C, Emacs Lisp)

### **1996-2003 Pullup**

Pullup ist at the heart of the Unix system administration at the Institute for Computer Science at the University of Tübingen. Pullup is a daemon that automates all relevant system management and maintenance tasks on Unix workstations. The infrastructure also contains a framework for a distributed and transparently replicated software installation, and a dynamic web server (based on SUnet) that automatically extracts documentation from the software installation.

(Unix, Mac OS X, Scheme, C)

### **2002- DeinProgramm**

The DeinProgramm project (<http://www.deinprogramm.de/>) aims to improve the quality of introductory teaching of programming at the university and high school level. The project has produced books, teaching material and software. I coordinate the project jointly with the University of Tübingen. We cooperate with the TeachScheme! project at Northeastern University.

## 5 Other projects

### **1997- Lula**

Lula (<http://www-pu.informatik.uni-tuebingen.de/lula/>) ist a system for stage lighting design that is in use by several theaters and theater groups in Germany. I am the sole designer and developer of the system; I have also implemented Unix device drivers for various hardware interfaces, as well as designed and built custom hardware based on microcontrollers.

(Unix, Windows, Mac OS X, C, Scheme, Assembler)

## **2002 HomeLab**

HomeLab is a project at Philips Research in Eindhoven – it develops IT infrastructure for use in the home. The Lula software controls their reactive home and entertainment lighting installation. I customized Lula to the special requirements of the project, interfaced it to the HomeLab electronics installation, and wrote a module for synchronizing to DVD playback. I also contributed to the development of the microcontroller interface for the HomeLab lighting instruments.

(Unix, Scheme, microcontroller)

## **6 Scientific work**

### **Publications**

- Various computer magazines, i.e. c't, mc (since 1985)
- Books:
  - *C auf dem Atari ST* (Heim-Verlag, 1986)
  - *Die Grafik-Connection* (Heim-Verlag, 1991), co-editor, together with Sebastian Egner, coordination of nine co-authors
  - *Vom Problem zum Programm* (Teubner, 2001), together with Herbert Klaeren
  - *Die Macht der Abstraktion* (Teubner, 2007), together with Herbert Klaeren
- Numerous publications at international conferences and scientific journals in programming languages (since 1995)

### **Activities**

- lecturer on programming languages and Internet programming
- research on theory and practice of programming, specifically on functional programming, compiler construction, and program specialization
- research on computer-assisted lighting design and control
- organisation and implementation of various seminars and research project
- organisation of the graduate seminar Advanced Topics in Programming
- organisation of the introductory curriculum, fall term 1999/2000, spring term 2001, fall term 2000/2001, fall term 2006/2007, spring term 2007, fall term 2008/2009, spring term 2009
- complete restructuring of the introductory curriculum, fall term 1999/2000, spring term 2001, fall term 2000/2001, fall term 2006/2007
- organization, coordination and design of the institute-wide system administration infrastructure
- planning and building computer pools for students
- supervision of Master's Theses, term projects, and student aides
- publications at numerous conferences and in scientific journals; numerous talks at international conferences
- contributions to many open-source software projects, among them a number of Internet applications
- project editor for the upcoming revision of the standard for the programming language Scheme

- organization of scientific events: ACM SIGPLAN 2005 Workshop on Scheme and Functional Programming (chair), Dagstuhl seminar 06181 „Latently-Typed Languages“ (initiator, organizer), ACM SIGPLAN 2008 International Conference on Functional Programming (workshop chair), ACM SIGPLAN 2008 Developer Tracks on Functional Programming (co-chair), Dagstuhl/GI workshop 09153 „The Intro Programming Course“ (initiator, organizer), ACM SIGPLAN 2009 International Conference on Functional Programming (workshop chair), ACM SIGPLAN 2009 Developer Tracks on Functional Programming (co-chair)
- member of various program committees (2001 Scheme Workshop, Partial Evaluation and Program Manipulation 2004, 2004 Scheme Workshop, Dynamic Languages Symposium 2006, International Conference on Functional Programming 2007)
- reviewer for various conferences and journals
- talks at various Universities, including Harvard, Brown, Northeastern, Purdue, Utah, Tübingen, Zittau/Görlitz, Stuttgart, Freiburg

## 7 Education and career

2003- Freelance software developer and consultant

2001–2003 Research assistant, Institute for Computer Science, University of Tübingen

2001 Ph.D. in Computer Science, University of Tübingen

1995-2001 Research associate, Institute for Computer Science, University of Tübingen

1994 M.Sc., Computer Science, University of Tübingen

1993-1994 major in Computer Science, University of Tübingen

1992-1995 major in der Mathematics, University of Tübingen

1992 B.Sc. in Mathematics and Computer Science, University of Hannover

1991-1992 major in Mathematics and Computer Science, University of Hannover

1990-1991 major in Mathematics, FernUniversität Hagen

1990-1991 public service, social service for the church community in Bissendorf

1990 High School diploma

1989-1990 Käthe-Kollwitz school, Hannover

1988-1989 Mellendorf High School

1987-1988 Radford High School, Honolulu, Hawaii (as an exchange student with the Congress-Bundestag program)

1984-1987 Mellendorf High School

### Awards

**General** Studienstiftung des Deutschen Volkes (1986), Congress-Bundestag program (1987-88), Baden-Württemberg colloquium „Energy and Environment“ (1994)

**Physics** „National Honors Program“ of the US Department of Energy at Fermi National Laboratory.

**Computer Science** Winner, programming contest of the working group „Mikrocomputer an Schulen GmbH“ („computers at schools“) (1984), winner, National Computer Science Competition (1986), fourth place, „EuroChip“ competition for innovations in hard- and software

**Product Testing** second place in national „Jugend testet“ („youth tests“) competition, 1987

**Forensics** finalist, state championship, Extemporaneous International Speaking in Honolulu, Hawaii, 1988