



## Peter C. Mehlitz

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### PROFILE

With more than 20 years of experience in specification, design, implementation and verification of large software systems, Mr. Mehlitz has held positions as systems analyst, lead developer, researcher and technical manager in government and industry. Being a developer at heart, Mr. Mehlitz spent most of this time in about ten projects for which he was often responsible from creation to delivery, including team management, securing funds and developing business models. While he has been mostly recognized for the design of complex software systems, his work frequently involved interfacing between research organizations, government, and a variety of companies ranging from startups to fortune 500.

Having personally programmed in excess of hundred thousand lines of code, using more than a dozen programming languages and operating systems, Mr. Mehlitz sees his role mainly as a technical lead for small, highly skilled and fast moving development teams. He has a special interest in software design patterns, programming languages, and space exploration.

### EXPERIENCE

#### **Senior Software Engineer, PSGS/NASA Ames Research Center, Moffett Field, CA since 2006**

Continued work in same position as technical lead for Java Pathfinder (JPF), especially in the context of UML state chart and User Interface model checking, including successful JPF application in partnership with industry.

#### **Principal Computer Scientist, CSC/NASA Ames Research Center, Moffett Field, CA 2002-2006**

Design, implementation and open sourcing of the *Java PathFinder* (JPF) software model checker - a state storing, backtracking Java Virtual Machine (VM) for verification of concurrent Java bytecode programs. The majority of this work was about redesigning the system to be modular and extensible, implementing on-the-fly partial order reduction for concurrent programs, introducing a mechanism to delegate execution from the JPF VM into the host VM (Model Java Interface), and redesigning the execution engine to support scheduling and data choices. JPF was open sourced in April 2005, and is the first NASA project that is hosted, developed and distributed on a public website ([javapathfinder.sourceforge.net](http://javapathfinder.sourceforge.net)).

Development of “[Design for Verification](#)” (D4V) methodology, using specialized software design patterns with associated property guarantees based on formally verifiable usage rules. Goal of this project was to show that general software design best practices can also be extended to enable better automated verification. Part of this work included reimplementing the K9 Contingent Rover Language ([CRL](#)) and executive system using standard design patterns, resulting in a threefold size reduction and a six times reduction of complexity hotspots.

Defining and presenting “Radiation Hardened Software”, an attempt to simulate and analyze single event effects like memory errors with virtual runtime systems, and to derive design guidelines for software that is resilient against radiation induced failures.

**Chief Technology Officer, Transvirtual Technologies, San Francisco, CA** **1998-2002**

Co-founded company to develop *Kaffe*, the first clean room, open source Java implementation that was ported to 30+ operating systems. Main technical activity was the development of a complete, portable graphics and user interface library system (AWT plus native libraries), especially targeting embedded devices without windowing systems (framebuffer devices). The completely skinnable AWT and its underlying embedded graphics system, the *Xoe Graphics Library* (XGL) were subsequently retargeted to other VMs and separately sold to a major Java vendor. Work on the core VM included implementation of a pthreads based Java thread system, extensions of *Kaffe's* user thread system, and development of performance measurement and debugging infrastructure.

Since 2000 increasing role in technical management of a team of finally up to 20 developers, working on *PocketLinux*, a complete Linux-, Java- and XML-based application architecture for handheld devices, leading to successful investment, cooperations with major consumer electronics device manufacturers and embedded software vendors, including several widely recognized showcases (LinuxWorld 2000, Comdex 2000, 2001) and articles (e.g. [slashdot.org](http://slashdot.org), [open magazine](http://openmagazine.com), [LinuxDevices.com](http://LinuxDevices.com)).

**Lead Developer/Architect, BISS GmbH, Wilhelmshaven, Germany** **1990-1998**

Responsible for design, implementation and technical management of three large scale software projects.

*BSA* - 1.5 Mloc, 500+ classes C++ application framework, sold to a number of European insurance companies, including system level functionality (graphical user interface, multi-threading, conservative mark&sweep garbage collector, RDBMS interfacing and rapid prototyping). The BSA featured an embedded scripting language (C++ subset) to save and restore runtime components.

*CThrough* - 300 kloc integrated development environment (IDE) for C++, written in Smalltalk, C++ and C. The system was used to develop and maintain the BSA, and later-on was sold separately as a end-user product. Functionality included design/documentation support, class/library browsers, debugging tools and a version control system for distributed development.

*BISS-AWT* - 50 kloc first lightweight widget, pure Java AWT implementation, which was presented at the first JavaOne conference and subsequently inspired libraries like *Swing*. The system also featured the first extensible Java IDE that was completely written in Java (using *BISS-AWT* user interface components). The system was distributed under an open source license and gained wide recognition in the Java community.

**System Analyst/Program Officer, Lieutenant Commander, German Navy** **1978-1990**

Responsible for creating the functional specification of a large, distributed command control and information system (CCIS) for naval air warfare, resulting in a 500+ pages *Structured Analysis* (SA) document. This work included extensive, autonomous on-site systems analysis at several naval air wings, and led to temporary assignments to major industry contractors and the *Federal Office of Defense Technology and Procurement* (BwB), providing technical- and user-domain expertise, and program management assistance. Technical tasks also involved design and implementation of program modules and data communication protocols.

## SKILLS

Design of object oriented software systems, including application frameworks, user interfaces, computer graphics, virtual machines, integrated development environments (IDEs) and verification tools, using UML and software design patterns.

Java, C/C++, Objective-C, Eiffel, Smalltalk, Fortran77, Pascal, CMS-2, knowledgeable in Ada2005, Scheme and Erlang. Extension languages like AspectJ, AspectC++ and JML for verification purposes like programming-by-contract and other property specifications.

Various POSIX compliant operating systems, including Linux (embedded and desktop), OS X, VxWorks, previously having worked with Win32 and OS/2.

## EDUCATION

University of the Federal Armed Forces, Munich, Germany — M.S. in aerospace engineering, 1984

Majored in control theory, computer simulation and flight mechanics under Ernst D. Dickmans, master's thesis: "Programs for three dimensional representation of root locations and control loop design". Finished top 3% of class.

## AWARDS

- Consecutive NASA Ames Contractor Council Individual Awards 2004 and 2005 for work on Java PathFinder and Design for Verification (D4V)
- NASA TGIR AWARD 2003, Java PathFinder team
- JavaWorld Editor's Choice Award 1998, category virtual machines, Kaffe/Transvirtual

## PUBLICATIONS & ARTICLES

- "Expecting the Unexpected: Radiation Hardened Software", P. Mehlitz, J. Penix, Infotech@Aerospace, AIAA 2005, Arlington VA, September 2005
- "Model Checking Realtime Java using Java PathFinder", G. Lindstrom, P. Mehlitz, W. Visser, Proceedings of the 3rd International Symposium on Automated Technology for Verification and Analysis (ATVA), October 2005
- "[Design for Verification with Dynamic Assertions](#)", P. Mehlitz, J. Penix, 29th NASA/IEEE software engineering workshop, Greenbelt MD, April 2005
- "[Design for Verification - Using Design Patterns to Build Reliable Systems](#)", P. Mehlitz, J. Penix, Proceedings of 6th ICSE workshop on component based software engineering, Portland OR, May 2003
- "Propel - Tools and Methods for Practical Source Code Model Checking", DSN 2003
- "[Linux and Java: The Story Goes On](#)", Developer.com 2000
- "[Patterns and Java - A Matter of Good Taste](#)", Developer.com 2000
- "[Design Patterns - Deja Vu at Work](#)", Developer.com 1999
- "[Kaffe - One for All](#)", Developer.com 1999

## CONFERENCES

- "Expecting the Unexpected: Radiation Hardened Software", "Seeing the Invisible: Embedding Tests in Code That Cannot be Modified", AIAA 2005, Arlington, VA
- "Java PathFinder Tutorial", Spin 2005, San Francisco, CA
- "Dynamic Assertions", SEW 2005, Greenbelt, MD
- "[Design for Verification](#)", CBSE 2003, Portland, OR
- "[Performance Analysis of Java Implementations](#)", Supercomputing 1999, Mannheim, Germany,
- "[Kaffe - One for All](#)", JIT'98 JavaDays, Frankfurt, Germany, 1998 (keynote)
- "Kaffe - Have a Free Java", Atlanta Linux Showcase, Atlanta, GA, 1998
- "[Going Native with Java's JNI](#)", "[Hidden Java Treasures](#)", Software Summit, Keystone, CO, 1998
- "[Creating a Customized GUI](#)", "[Using Patterns in Java](#)", Software Summit, Keystone, CO, 1997