

Heiko Joerg Schick

Graduate Engineer in Communications and Software Engineering
Hardware and Software Development



Personal Information

Date of Birth	June 16, 1979
Nationality	Germany
Marital Status	Single Male

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Employment History

since 04/2009	IBM Deutschland R&D GmbH Open Systems Firmware Development
<p><u>Main Area:</u> Blue Gene/Q PCI Express verification and bring-up lead.</p> <p><i>Blue Gene</i> is an IBM Research project to explore the frontiers in supercomputing, in computer architecture, in the software required to program and control massively parallel systems and in the use of computation to advance the understanding of biological processes, hydrodynamics, quantum chemistry, quantum chromodynamics, molecular dynamics, climate modeling and financial modeling.</p> <p><i>PCI Express</i> is the new serial bus addition to the PCI series of specification. It is a high-bandwidth, low pin count, serial interconnect technology and provides a high performance I/O infrastructure for high-end server platforms. PCI Express defines a physical, link and protocol layer for a point to point topology over copper wire or optical fiber. The broad adoption of PCI Express in the mobile, enterprise and communication segments enables convergence through the re-use of a common interconnect technology.</p>	

01/2008 - 03/2009	IBM Deutschland R&D GmbH Open Systems Firmware Development
<p><u>Main Area:</u> Firmware project and bring-up lead of the QPACE project.</p> <p><i>QPACE</i> is pursuing the development of a massive parallel, scalable supercomputer for applications in lattice quantum chromodynamics (QCD). The machine structure is a three-dimensional torus of identical processing nodes, based on the IBM PowerXCell 8i processor. These nodes will be tightly coupled by an FPGA-based, application-optimized network processor attached to the IBM PowerXCell 8i processor.</p> <p>The development of QPACE is a common effort of several academic institutions together with the IBM Research and Development Lab in Boblingen, Germany. The academic partners include the Universities of Regensburg and Wuppertal as well as the research labs DESY and Juelich and the Universities of Ferrara and Milano.</p> <p><u>Additional Areas:</u> AbiCell and NICOLL project lead.</p>	

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09/2006 - 12/2007	<u>IBM Deutschland R&D GmbH</u> Open Systems Firmware Development
<p><u>Main Area:</u> Cell/B.E. and PowerPC 970 firmware development and blade server hardware design as well as InfiniBand and PCI Express firmware and hardware bring-up.</p> <p><u>Additional Areas:</u> AbiCell and NICOLL project lead.</p> <ul style="list-style-type: none"> • AbiCell, the goal of this project is to study the performance potential of InfiniBand connected Cell clusters by implementing selected parallel compute kernels of Abinit, a widely used open source code for ab initio electronic structure calculations. • NICOLL, the objective of this project is to develop a prototype solution for an interface architecture that fits best the needs of the Cell/B.E. processor HW-SW infrastructure in hybrid system. If necessary, techniques of device virtualization will be applied. The focus is on interfacing InfiniBand as an example solution for a high-speed cluster interconnects technology. With respect to collective communication operations the focus is on the Message-passing Interface (MPI). 	

09/2004 - 08/2006	<u>IBM Deutschland R&D GmbH</u> I/O Firmware Development II
<p><u>Main Area:</u> Linux device driver development for IBM System p eHCA InfiniBand and eHEA Ethernet adapter.</p> <ul style="list-style-type: none"> • eHCA InfiniBand Adapter, is used in high-performance-computing (HPC) clusters. The device driver was developed for Linux on PPC64 and is compatible to the unified Open Fabrics Alliance open-source software stack for InfiniBand which is one of the major RDMA technologies. To leverage the eHCA InfiniBand adapter an application can call directly IB verbs or uses upper-level protocols like the Message Passing Interface (MPI), TCP/IP over InfiniBand (IPoIB) or Socket Direct Protocol (SDP). The device driver is included in Linux kernel since 2.6.19. • eHEA Ethernet Adapter, is used in IBM POWER6 based systems. The device driver supports the network main functionality including TCP segmentation offload (TSO), broadcast, multicast, VLAN and ethtool. It is included in Linux kernel since 2.6.19. <p><u>Additional Areas:</u> Technical bring-up and development lead of project <i>JULI</i>, which aimed at developing and evaluating a parallel compute cluster based on IBM BladeCenter JS21 nodes and QLogic's InfiniPath network components. The cluster was presented at the International Supercomputing Conference 2006 in Dresden, Germany.</p>	

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05/2004 - 08/2004	<u>IBM Deutschland R&D GmbH</u> Processor Firmware Development
<u>Main Area:</u> Diploma Thesis: Concept, Design and Implementation of a Slimline Boot Firmware for Linux on Power Architecture.	

01/2003 - 04/2004	<u>IBM Deutschland R&D GmbH</u> Processor Firmware Development
<u>Responsibility:</u> Assembler for PPC64, C and Forth programming.	
<u>Additional Areas:</u> Implementation of a Linux program to trace on program execution machine instructions and analyze how they will be executed in the several processor pipelines of the IBM System z mainframe. The program was used to optimize the IBM System z back-end of the GNU Compiler Collection (GCC) for avoidance of address generation interleaves or additional pipeline delays which can be caused during floating-point calculations.	

07/2002 - 10/2002	<u>IBM Deutschland R&D GmbH</u> Linux on System z Evaluation
<u>Responsibility:</u> Evaluated the functionality of running many Linux instances in a virtual machine on IBM System z. Within the VM environment, Linux images benefit from the ability to share hardware and software resources and use internal high-speed communications. While benefiting from the reliability, availability and serviceability of IBM System z mainframes, z/VM offers an ideal platform for consolidating selected workloads on a single physical server which allows customers to run hundreds to thousands of Linux images.	

08/2001 - 02/2001	<u>IBM Deutschland R&D GmbH</u> Linux on System z Evaluation
<u>Responsibility:</u> Evaluation of the cryptographic <i>z90crypt</i> device driver for System z which is a generic character device driver that routes work to a supported cryptographic coprocessor or accelerator device installed on the system.	

Education

10/2000 – 08/2004	Albstadt-Sigmaringen University Diploma degree in Communications and Software Engineering (<i>summa cum laude</i>)
<p>Diploma Thesis: Concept, Design and Implementation of a Slimline Boot Firmware for Linux on Power Architecture.</p> <ul style="list-style-type: none"> Architecture of a technology how binary program code can be packaged within the firmware and executed later, by the operating system, with the usage of small virtual machine. 	

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Professional Qualification

- Multi-year experience in high-tech IT and supercomputer development projects as hardware and software developer, project manager, bring-up manager and technical lead.
- Collaboration with globally integrated teams.
- Operating Systems: Linux Kernel Development, Linux on System p, Linux on Cell/B.E., Mac OS X and Windows.
- Computer Languages: C, C++, Java, Forth, Perl, Bash and Assembler (*PowerPC, POWER and Cell Broadband Architecture*).
- Software Development and Firmware Development: Open Firmware, UNIX System Programming, Client/Server System and Software Patterns.
- Network and Interconnect Technologies: PCI Express, HyperTransport, InfiniBand and Ethernet.
- Computer Architecture: Accelerator Concepts and Hardware Design.

Awards

- IBM Equity Award for critical contributions to IBM's success, 2009.
- IBM Bravo! Award for results beyond normal job and performance expectations, 2006.
- IBM Author Recognition Award, 2005.
- Award of the Philipp-Matthaeus-Hahn Donation for having the highest grades in the graduating class at Albstadt-Sigmaringen University, 2004.

List of IBM Internal Publications

- Cell/B.E. Accelerator Concept*, H. J. Schick, H. Penner, H. Hering and O. Wohlmut, Innovative Showcase at Technical Leadership Exchange Conference in Orlando, Florida, USA, April 2008.

2. *CELL/B.E. Accelerator Concept*, H. Penner, H. J. Schick, O. Wohlmuth and H. Hering, Early Career Conference, September 2007.
3. *An Open Firmware*, H. J. Schick and J. Kunigk, Academy of Technology Conference on Open Source Experiences and Best Practices, IBM Toronto Labs, March 2007.

List of External Publications

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1. *Cell/B.E. tightly coupled via PCI Express*, H.J. Schick, Workshop about Future Activities on High Performance Computing in Ferrara, Italy, November 2009.
2. *directCell: Hybrid systems with tightly coupled accelerators*, H.J. Schick et al., Hybrid Computing System, IBM Journal of Research and Development, Volume 53, Number 5, 2009.
3. *The QCD Network Processor*, H. J. Schick et al., XXVII International Symposium on Lattice Field Theory in Beijing, China, July 2009.
4. *directCell: The Cell/B.E. as a Tightly Coupled Accelerator*, Poster at International Supercomputing Conference in Hamburg, Germany, June 2009.
5. *Run-Time Reconfiguration for HyperTransport Coupled FPGAs using ACCFS*, J. Strunk, A. Heinig, T. Volkmer, W. Rehm and H. J. Schick, Proceedings of First International Workshop on HyperTransport Research and Applications (WHTRA), February 2009.
6. *Impact of Run-Time Reconfiguration on Design and Speed - A Case Study Based on a Grid of Run-Time Reconfigurable Modules Inside a FPGA*, J. Strunk, T. Volkmer, K. Stephan, W. Rehm and H. J. Schick, Proceedings of Reconfigurable Architectures Workshop in Conjunction with IPDPS, February 2009.
7. *ACCFS - Operating System Integration of Computational Accelerators Using a VFS Approach*, A. Heinig, J. Strunk, W. Rehm and H. J. Schick, Proceeding of Applied Reconfigurable Computing, February 2009.
8. *Communication Networks Attached to the IBM PowerXCell 8i I/O Fabrics*, H. J. Schick, Workshop for Network Specification and Software Data Structures for the eQPACE Architecture in Juelich, Germany, February 2009.
9. *QPACE: Quantum Chromodynamics Parallel Computing on the Cell Broadband Engine*, H. J. Schick et al., Article in Computing in Science and Engineering, vol. 10, no. 6, pp. 46-54, November/December 2008.
10. *QPACE: QCD Parallel Computing on Cell/B.E.*, H. J. Schick et al., Poster at International Conference for High Performance Computing in Austin, Texas, USA, November 2008.
11. *Status of the QPACE Project*, H. J. Schick et al., XXVI International Symposium on Lattice Field Theory in Williamsburg, Virginia, USA, July 2008.

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12. *ACCFS (Accelerator File System) - A Case Study Towards a Generalized Accelerator Interface*, A. Heinig, W. Rehm and H. J. Schick, Poster at International Supercomputing Conference in Dresden, Germany, June 2008
13. *Generalizing the SPUFS concept - A Case Study towards a Common Accelerator Interface*, A. Heinig, J. Strunk, R. Oertel, W. Rehm and H. Schick, Many-core and Reconfigurable Supercomputing Conference (MRSC) 2008 in Belfast, North Ireland, April 2008.
14. *Code Optimization for Cell/B.E. - Opportunities for ABINIT - A Software Package for Physicists*, T. Schneider, S. Wunderlich, W. Rehm and T. Hoefler and H. J. Schick, Poster at the IBM CAS Software and Systems Engineering Symposium in Dublin, North Ireland, October 2007.
15. *Heterogeneous Multiprocessing - On a Tightly Coupled Opteron Cell Evaluation Platform*, A. Heinig, J. Strunk, W. Rehm and H. J. Schick, Poster at the IBM CAS Software and Systems Engineering Symposium in Dublin (North Ireland), October 2007.
16. *Slimline Open Firmware*, Lab Session, H. J. Schick, H. Penner, O. Wohlmuth, Power Architecture Developer Conference '07 in Austin, September 2007.
17. *JULI Project - Final Report*, U. Detert, A. Thomas, N. Eicker, J. Broughton, March 2007.
18. *Concept, Design and Implementation of a Slimline Boot Firmware for Linux on Power Architecture*, H. J. Schick, Diploma Thesis, August 2005.
19. *Slimline Open Firmware*, Demo, O. Wohlmuth, H. Penner, S. Boessenkool, S. Koch, H. J. Schick, Power.org Event in Barcelona, Spain, June 2005.

Lectures

1. *Research Project QPACE – QCD Parallel Computing on the Cell Broadband Engine*, Association of German Engineers, November 2009.
2. *High Performance Computing: Blue Gene/L*, Association of German Engineers, November 2005.
3. *The IBM Cell Processor - Computing of tomorrow or yesterday?*, Association of German Engineers, April 2004.

Patents and Disclosers

1. *Apparatus for analyzing communication between a blade server and its expansion units or daughter cards*, Disclosure on IP.com Prior Art Database, October 2008.

Language Skills

German	Native Speaker
English	Fluent
French	Intermediate

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Interests

- Sports: Triathlon (*Swimming, Cycling and Running*) and Scuba Diving.
- Languages, international travel and intercultural collaboration.
- Support endeavors in emerging countries to identify new opportunities.
- Mentoring with student and young professionals.
- Understand where the world is heading to foresee the future and tendencies of global change.
- Different cultures, history and politics.