



Computer Science and Artificial Intelligence Laboratory

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Heather L. Wagner
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Dear Ms. Wagner:

I am pleased to recommend Dr. Volker Strumpen for a permanent research position at IBM Research. Volker was a Postdoctoral Associate in my research group at MIT for two years during 1996–1998. I also worked with him at Akamai Technologies, and I have interacted with him sporadically since he returned to MIT as a Research Scientist. I am highly impressed with Volker's knowledge, abilities, and intellect, especially in the areas of operating systems and distributed systems.

Volker first came to my attention five or six years before when I came across his work on network computers. While at ETH in Zürich, Switzerland, Volker had engaged 1,000 workstations across five continents to run a molecular dynamics code in parallel, a remarkable accomplishment. Subsequently, Volker built a virtual operating system interface so that other applications could easily be run on such a network computer. This work is unfortunately not well known in the United States, although many research groups are now trodding down the same path that Volker pioneered years ago.

In part because of his inability while in Europe to have an impact in the U.S., Volker came to the United States. Not being well connected to the research communities here, he accepted an assistant professorship at the University of Iowa. After a year in Iowa, he realized that he could have more research impact if he were located at a major research university, even if it meant accepting a lower position. Consequently, he accepted my offer to become a Postdoctoral Associate in the MIT Laboratory for Computer Science.

Volker's work on network computers led him to realize that a coherent strategy for fault tolerance was a necessity for distributed parallel computing to become a practical reality. While at Iowa and later at MIT, Volker devised and implemented a unique tool called "**porch**" to make the design of fault-tolerant codes more straightforward. Volker's **porch** compiler can translate a portable C program into another C program that is capable of saving and recovering from portable checkpoints on binary incompatible machines. Volker produced a great demo where he runs a program on an UltraSPARC, kills it, ftp's the portable checkpoint file to a Pentium PC, and then resumes the computation. Many eminent researchers have expressed surprise that this scenario is possible for C programs, since C is not strongly typed. Nevertheless, Volker's **porch** compiler handles the problems involved with stack, pointers, byte alignment, and data representation.

In addition to his research, Volker provided my research group with a solid systems foundation.

He designed the mechanisms by which the runtime system of our Cilk multithreaded language could use thread-local storage, even though typical threads facilities provided by operating systems do not support this abstraction. He supervised the theses of several Master's students, providing them with a patient and knowledgeable mentor. With another student Ken MacKenzie, he ported Cilk to Anant Agarwal's Fugu workstation running with Frans Kaashoek's exokernel operating system: three experimental systems, all of which he managed to make work together successfully. Moreover, he provided experienced behind-the-scenes advice to our systems management, which has smoothed our computer systems operations substantially. He was usually the first person to have direct experience with any new equipment that entered the lab.

Volker has worked with me consulting for Pratt & Whitney on their parallel processing system which routinely allows designers to run hundreds of parallel jobs every night on thousands of workstations. Our work was as expert witnesses in a legal case, and Volker's mastery of real-world systems issues was considered invaluable by the lawyers.

At Akamai Technologies, Volker led the effort to develop a system for testing software components of a distributed system. Akamai runs a nonstop network of over 15,000 servers world-wide, and the greatest threat to its integrity occurs during the deployment of new software. Volker's system mimicked a distributed environment for a software component, allowing programmers to test their software in a laboratory setting. In addition, Volker built a prototype of a novel traffic-management system for multihomed routers, an effort which was spun off as a new company, Sockeye Networks. Since returning to MIT, Volker has led the design effort for the operating system of the RAW architecture, a system that allows its underlying hardware to be reconfigured as the system runs.

Volker's systems ability is as strong as it comes. His knowledge of engineering applications of computers, including scientific computation, is prodigious. Coupled with his strong hands-on experience with computer systems and his unfailing pragmatism, Volker's special collection of talents makes him a unique and valuable resource.

In summary, Volker's research has been outstanding, and he has a broad knowledge of computer systems. He has been a fine advisor of Master's students and undergraduates. I believe he is well qualified for the position, and I am pleased to give him my recommendation.

Sincerely,

Charles E. Leiserson
Professor

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