

William C. Benton

313 Oldfield Road
Madison, WI 53717
☎ +1 (608) 469-5442
✉ willb@acm.org

Professional Interests

My primary *research interests* are *program analysis*, *type systems*, and *concurrency*, especially fine-grained concurrency for multi-core architectures. I am also interested in *declarative* tools for program analysis and *runtime systems* for managed languages. In industry, I have worked on *distributed systems* and applications of *declarative programming* and *program analysis* to make clusters easier to program for and manage.

My *teaching interests* include *first courses*, which introduce our discipline to the rest of the academy, and survey and topics courses in *programming languages* and *systems*.

Education

- 2008 **PhD (computer sciences)**, *University of Wisconsin–Madison*.
Advised by Prof. Charles Fischer.
Dissertation title: *Fast, Effective Program Analysis for Object-Level Parallelism*.
Minor coursework in analytic philosophy and musical applications of digital signal processing.
- 2003 **MS (computer sciences)**, *University of Wisconsin–Madison*.
- 2000 **BA cum laude (philosophy, music, computer science)**, *St. Olaf College*.

Academic Employment

- 2008 – present **Researcher**, *Computer Sciences Department, University of Wisconsin*.
courtesy appointment
- 2005 – 2007 **Senior Teaching Assistant**, *Computer Sciences Department, University of Wisconsin*.
- 2005 – 2007 **Lecturer**, *Computer Sciences Department, University of Wisconsin*.
- 2003 **Teaching Assistant**, *Computer Sciences Department, University of Wisconsin*.
- 2000 – 2004 **Research Assistant**, *Computer Sciences Department, University of Wisconsin*.
- 1997 – 2000 **Teaching Assistant**, *Departments of Computer Science and Music, St. Olaf College*.

Awards and Honors

- 2007 **ACM SIGPLAN PAC Travel Grant**.
Awarded a grant to present at PPDP 2007 in Wroclaw, Poland.
- 2007 **Teaching Fellow**, *College of Letters and Science, University of Wisconsin*.
Selected from nearly 1,300 candidates as one of fifteen graduate teaching assistants who “have achieved outstanding success as students and teachers.” *See also under Professional Service*.

- 2006 **Outstanding Graduate Student Instructor Award**, *Computer Sciences Department, University of Wisconsin*.
Nominated by former students and selected from over 50 teaching assistants in the Computer Sciences Department as the sole recipient of this award for 2006.
- 1999 **E.O. Ringstad Prize in Philosophy**, *St. Olaf College*.
Awarded prize in philosophical essay competition.

Publications

Refereed Articles

William C. Benton, Robert H. Rati, and Erik J. Erlandson. Wallaby: A scalable semantic configuration service for grids and clouds. In *Proceedings of the Conference for High Performance Computing, Networking, Storage and Analysis (SC11)*. November 2011.

William C. Benton and Charles N. Fischer. Mostly-functional behavior in Java programs. In *Proceedings of the Tenth International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI '09)*, pages 29–43. January 2009. **24 of 72 papers accepted (33%)**

William C. Benton and Charles N. Fischer. Interactive, scalable, declarative program analysis: from prototype to implementation. In *Proceedings of the 9th ACM SIGPLAN International Symposium on Principles and Practice of Declarative Programming (PPDP '07)*, pages 13–24. July 2007. **20 of 87 papers accepted (23%)**

Editorial Work

- 2003–2011 William C. Benton, ed. <http://compiler-tools.org/>. *A Catalog of Research Compilers and Tools*. Curated web directory for programming language and compiler researchers.
- 2009 Charles N. Fischer, Ron K. Cytron, and Richard J. LeBlanc, Jr. *Crafting a Compiler*. Addison-Wesley. Served as a technical reviewer and editor and contributed the section on region-based memory management.

Other Publications

William C. Benton. *Fast, Effective Program Analysis for Object-Level Parallelism*. Doctoral dissertation. University of Wisconsin—Madison. December 2008.

William C. Benton. “Improving System Security with Loadable Kernel Module Exploits.” *Linux Journal*. September 2001.

Select Presentations

“An Introduction to Distributed Analytics with Apache Spark.” LinuxCon 2014. Chicago, IL. August 20, 2014.

“Analyzing endurance-sports activity with Apache Spark.” Spark Summit 2014. San Francisco, CA; July 1, 2014

“Condor High Availability.” Condor Week 2012. Madison, WI; May 1, 2012.

“Tutorial: Configuring Condor with Wallaby.” Condor Week 2011. Madison, WI; May 3, 2011.

“Improving Condor configuration management with Wallaby.” Condor Week 2010. April 15, 2010.

“Type-based program analysis.” St. Olaf College Mathematics and Computer Science Colloquium. March 11, 2008.

“Statically identifying implicit module-level parallelism.” University of Wisconsin Computer Architecture Seminar. **Invited talk.** March 7, 2006.

“Effect systems and applications.” University of Wisconsin Programming Languages Seminar. March 3, 2005.

“Identifying Class-Level Parallelism in Object-Oriented Programs.” University of Wisconsin Programming Languages Seminar. April 28, 2004.

“The SSSCA: What does it mean for us?” Guest lecture in Prof. James Goodman’s “Computers and Society” course. **Invited talk.** March 5, 2002.

“MIPS/Irix Paradyn on a multi-node SGI Origin.” Demo presentation for Paradyn and Condor Week, March 14, 2001.

Select Open-source Software

William C. Benton. *sur la plaque*. A collection of analytics applications for time-series bicycling data. <https://github.com/willb/sur-la-plaque>

William C. Benton. *Wallaroo*. A next-generation semantic configuration management service for HTCondor pools. <https://github.com/willb/wallaroo>

William C. Benton. *Rhubarb*. A library for transparent object-graph persistence in Ruby. <http://rubygems.org/gems/rhubarb>

William C. Benton. *SPQR: Schema Publishing for QMF/Ruby agents*. A library for effortless RPC and remote object management. <http://rubygems.org/gems/spqr>

William C. Benton. *Capricious*. A framework for controlled randomness (parameterized on a pseudo-random number generator and a probability distribution simulator) for testing and simulations. <http://rubygems.org/gems/capricious>

William C. Benton. *Wallaby*. A scalable service for managing and versioning HTCondor configurations across entire pools of compute and scheduling nodes. <http://getwallaby.com>

Research and Industry Experience

- September 2008 – **Senior Software Engineer, Red Hat, Inc.**
present Have worked in open-source communities on distributed computing technologies. Packaged open-source software for Fedora and Red Hat Enterprise Linux. Contributed enhancements and fixes to many projects including Apache Spark, the sBT build tool and the HTCCondor job scheduling system. Designed and implemented open-source projects including SPQR, a framework for distributed applications in Ruby; *Rhubarb*, an transparent object-graph persistence framework; *Capricious*, a family of pseudorandom number generators; *Wallaby* and *Wallaroo*, two sophisticated configuration management servers; and *sur la plaque*, a collection of applications for analyzing time-series fitness data.
- Summer 2003 – **Research Assistant, Computer Sciences Department, University of Wisconsin.**
Fall 2008 Supervised by Prof. Charles Fischer. Investigated a range of topics, including performance analysis of high-level language features, novel program analyses and transformations for Java, design and implementation of a logic programming environment for program analysis, and runtime support for opportunistic parallelism in a Java virtual machine.
- Summer 2005 – **Teaching Assistant/Lecturer, University of Wisconsin.**
Fall 2007 Lectured and developed course materials, including slides, handouts, and programming projects, for introductory and senior-level computer science courses, both as a graduate assistant (five regular semesters) and as a lecturer (three summer contracts). Awarded departmental teaching honors in 2006 and university-wide teaching honors in 2007.
- October 2005 – **Independent Consultant, hired by Thumtronics Ltd, Bussleton, Western Australia.**
April 2006 Assisted in refining a proprietary, novel audio synthesis algorithm from a high-level specification. Developed a prototype implementation and prepared thorough documentation covering how to realize the algorithm as an efficient software instrument.
- Fall 2000 – **Research Assistant, Computer Sciences Department, University of Wisconsin.**
Spring 2003 Supervised by Prof. Barton Miller. Assisted with maintenance, development, and documentation of the Paradyn parallel performance analysis tool and the Dyninst dynamic instrumentation library, using C and C++. Ported the Paradyn front-end to use POSIX threads. Maintained the SGI IRIX port of Dyninst; discovered and reported a subtle bug in the IRIX kernel.
- Summer 2000 **Consultant, Devon Consulting, Wayne, PA.**
Implemented document management system that used Java, JDBC, Oracle, and DCOM to parse semi-structured reports written in Microsoft Word and publish a dynamic web site.
- Summer 1999 **Summer Student Intern, SmithKline Beecham, Inc., King of Prussia, PA.**
Developed a highly-concurrent web spider to aid in maintaining a database of internet resources and articles. Developed a Java framework based on Cardelli and Davies' *service combinators* abstraction, to aid other developers in writing concurrent and network programs.

Teaching Experience

Introductory and Service Courses

- Fall 2007 **Instructor, Computer Sciences Department, University of Wisconsin.**
Spring 2007 Lectured and developed course materials, including slides, handouts, and programming projects, for one section of an introductory course taught in Java. This course covers the Java language, object-oriented design, and programming to solve problems. It is the first course in the undergraduate Computer Sciences major, but it is also an important service course, since it meets many graduation and program requirements. *See also under Service.*
- Fall 2006
Spring 2006
Fall 2005

- Summer 2007 **Lecturer**, *Computer Sciences Department, University of Wisconsin.*
- Summer 2006 Appointed to two fixed-term summer lectureships. Lectured and developed course materials, including slides, handouts, and four programming projects, for a summer section of an introductory course taught in Java. Supervised and managed teaching assistants.
- Spring 2005 **Teaching Assistant**, *Computer Sciences Department, University of Wisconsin.*
- Summer 2003 Held office and lab hours; instructed students in an introductory course one-on-one.
- 1997 – 2000 **Teaching Assistant**, *Department of Mathematics and Computer Science, St. Olaf College.*

Instructed students one-on-one, assisting with material from a wide variety of computer science courses. Graded papers for an introductory CS course taught in Scheme, for a data structures course taught in C++, and for a software engineering course taught in C++; also led lab sections for the latter.

Senior-level Courses

- Summer 2005 **Lecturer**, *Computer Sciences Department, University of Wisconsin.*
- Appointed to fixed-term summer lectureship. Lectured and developed course materials, including handouts, problem sets, and programming projects, for a summer section of a senior-level undergraduate operating systems course. The course covers topics including concurrency, process scheduling, virtual memory and memory management, I/O, file systems, and security. It is also the first exposure many students have to the C language, manual memory management, and the standard UNIX software development environment.

Graduate Courses

- Spring 2006 **Teaching Assistant**, *Computer Sciences Department, University of Wisconsin.*
- Spring 2005 Held office hours, responded to student questions, graded papers, and managed software infrastructure for one section of the graduate-level programming languages course. This course covers topics including the lambda-calculus, type systems and type inference, partial evaluation, and abstract interpretation.

Courses Outside Computer Sciences

- Fall 1999 **Teaching Assistant**, *Department of Music, St. Olaf College.*
- Planned, organized, and led weekly review and discussion sections for the first course in the required music history sequence for majors, which covers Western European art music from the Medieval through Baroque periods.

Professional Service

- 2014 **Birds-of-a-feather Committee Member**, *The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC14).*
- 2009 **External reviewer for Technical Program**, *The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC09).*
- 2007 **College of Letters and Science Teaching Fellow**, *University of Wisconsin.*
- Cooperated with other Fellows to organize Fall training sessions for teaching assistants from across the College. Presented a workshop on developing course materials; handouts are available at <http://pages.cs.wisc.edu/~willb/lsta/>.

2005 – 2007 **Instructor**, *Computer Sciences Department, University of Wisconsin.*

Developed materials for students – handouts, examples, projects, and multimedia slides – that have been used by multiple instructors. Developed materials intended for training other instructors and teaching assistants. Pioneered initiative to automate project grading with a standard unit testing framework; see <http://pages.cs.wisc.edu/~willb/junit/>.

since 2004 **Moderator**, *Computer Sciences Department, University of Wisconsin.*

Founded and moderated pl-chat, an intradepartmental mailing list to facilitate discussion of issues related to programming language research.

Professional Affiliations

2000–present Member, *Association for Computing Machinery.*

2000–present Member, *ACM Special Interest Group on Programming Languages*