

# Dean Wampler, Ph.D

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## Technical Leadership for Generative AI and Data-Intensive

My expertise:

- **Engineering Leadership:** I have led several engineering teams in IBM Research, for the [AI Alliance](#), the Accelerated Discovery platform (not public), and [WatsonX Platform Engineering](#). At Lightbend, I conceived the [Lightbend Fast Data Platform](#) and formed the team that built it. I seek the best solutions with customers and partners, such as AI Alliance members and the IBM Research partnership with Cleveland Clinic Foundation.
- **Artificial Intelligence and Machine Learning:** Engineering and project leadership for Generative AI, “classic” machine learning, and reinforcement learning using a variety of technologies at IBM Research, Anyscale, Domino Data Lab, and Lightbend.
- **Big Data and Streaming Architectures (“Fast Data”):** Ray, Spark, Kafka, Kubernetes/OpenShift, Hadoop, etc. Many of my conference talks and recent writings have discussed the convergence of streaming and ML.
- **Programming Technology:** Functional Programming, Scala, Python, Java, and other languages and tools.
- **Software Development Lifecycle and Team Leadership:** Distributed team building, process improvement, and mentoring. Former XP/Agile Software Development consultant.
- **Developer Relations and Evangelism:** Conference speaking, webinars, training, writing, and analyst briefing for AI at the AI Alliance, ML/AI and reinforcement learning with Ray at Anyscale and Fast data at Lightbend.

I am a widely-known author and conference speaker, including the following (full list below):

- **Scala 3** blog series ([Medium](#), 2020-2021).
- **Programming Scala, Third Edition:** ([O'Reilly](#), 2021) A comprehensive introduction to Scala 3.
- **Fast Data Architectures for Streaming Applications, Second Edition:** ([O'Reilly and Lightbend](#), 2018) Trends in streaming data technologies, how to select them, and how to build systems with them.
- **What Is Ray?:** ([O'Reilly](#), 2020) How Ray simplifies distributed computing, especially for ML/AI.
- **Hardware > Software > Process:** (co-author Paco Nathan, [NVIDIA/Manning](#), 2021) Understanding hardware is essential for performant data-intensive applications.
- **Industry Conference Speaker:** Strata Data + AI, GOTO Chicago, GOTO AI Days, YOW!, Ray Summit, ODSC, MLOps, ScalaWorld, Scala Days, StrangeLoop, QCon, Reactive Summit, AOSD, OOPSLA, and others. My talks are available at [polyglotprogramming.com/talks](http://polyglotprogramming.com/talks). (I co-organized some of these events)



## Experience

<p><b>IBM Head of Technology, the <a href="#">AI Alliance</a></b>  <a href="#">IBM Research</a>  USA  November, 2023 - Present</p>	<p>I am IBM's technical lead for the <a href="#">AI Alliance</a>, a global consortium of companies, non-profits, and research institutions committed to open, accessible Generative AI models and tools. The Alliance <a href="#">promotes openness</a> across the spectrum of AI: models, like <a href="#">Meta's Llama</a> family and those available through <a href="#">Hugging Face</a>, <a href="#">open data sets</a>, tools and techniques for <a href="#">safety</a>, pretraining, inference, tuning, and application patterns like RAG. Also, the Alliance promotes basic research and education, including research grants and GPU resources.</p> <p>AI Mentor at <a href="#">1871</a> - Advising startups on effective use of AI</p>
<p><b>Engineering Director, watsonx Platform Engineering and Accelerated Discovery Platform</b>  <a href="#">IBM Research</a>  USA  January 2022 - November 2023</p>	<p>I led the engineering team building <a href="#">watsonx.ai</a> core components for AI model inference and tuning (fine-tuning and prompt-tuning), and application development patterns.</p> <p>Previously, I built the engineering team and all engineering processes to productize cloud-native services for <i>Accelerated Discovery Platform</i>, which leveraged IBM Research technologies in Quantum Computing, Artificial Intelligence, Generative Modeling, Simulation, and Hybrid Cloud for applications such as molecular discovery (e.g., pharmaceuticals and material science) and digital-health.</p> <p>I was also a member of the Joint Steering Committee and I was the lead for the Infrastructure Committee for the IBM-Cleveland Clinic Foundation partnership. I worked with CCF technical leadership and research teams on implementing joint <i>Statements of Work</i> (SOWs) using Accelerated Discovery Platform and IBM Cloud.</p>
<p><b>Principal Software Engineer</b>  <a href="#">Domino Data Lab</a>  USA  September 2020 - January 2022</p>	<p>I reported to the <i>Chief Product and Technology Officer</i>. I worked on projects to improve the architecture and quality of Domino products for Data Science and MLOps. I also worked on forward-looking technical initiatives.</p> <p>During this time I completed the third edition of <a href="#">Programming Scala, Third Edition</a>, cowrote the NVIDIA/Manning report <a href="#">Hardware &gt; Software &gt; Process</a> (with Paco Nathan), and contributed a chapter to O'Reilly Media's <a href="#">97 Things Every Data Engineer Should Know</a>.</p>
<p><b>Head of Developer Relations</b>  <a href="#">Anyscale</a>  USA  November 2019 - September 2020</p>	<p>Anyscale is a startup developing services around the OSS project <a href="#">Ray</a>, a system for distributing Python applications from a laptop to a cluster with relative ease. Ray was started at UC Berkeley to enable researchers in artificial intelligence to more easily develop cutting-edge tools for reinforcement learning and hyperparameter tuning, where cluster-wide execution of work is essential.</p> <ul style="list-style-type: none"> <li>• I ran all facets of developer relations. I was the de-facto head of marketing.</li> <li>• My team organized <a href="#">Ray Summit</a>, a conference devoted to Ray and its ecosystem, and a series of online events called <a href="#">Ray Summit Connect</a>. I also led the technical program committee for selecting content for these events.</li> <li>• I ran the evangelism strategy, including conference and Meetup appearances, blogging, webinars and podcasting, newsletters, and advertising.</li> <li>• I wrote the O'Reilly report, <a href="#">What Is Ray?</a> and the tutorial <a href="#">Scaling Python Processing with Ray</a> for the O'Reilly Online Learning platform.</li> <li>• I created <a href="#">Anyscale Academy</a>, the open-source, modular training for Ray and its ML/AI libraries. I conducted three live training events for this material.</li> <li>• I taught tutorials and delivered talks on Ray at various industry conferences and Meetups.</li> <li>• I contributed to engineering efforts, recruitment, etc.</li> </ul> <p>I also contributed a chapter to <a href="#">97 Things Every Java Programmer Should Know</a>.</p>

<p><b>VP, Fast Data Engineering</b> formerly <b>Architect for Big Data Applications and Services, Office of the CTO</b> <a href="#">Lightbend</a> International November 2013 - October 2019</p>	<p>Created <a href="#">Lightbend Fast Data Platform</a>, then led the engineering team that built it.</p> <ul style="list-style-type: none"> <li>I conceived the product and technical vision for a next generation, <i>fast-data</i> (streaming) platform with integrated support for application development: <ul style="list-style-type: none"> <li><a href="#">Apache Kafka</a> as the data backplane</li> <li>Four streaming engines: <a href="#">Apache Spark</a>, <a href="#">Apache Flink</a>, <a href="#">Akka Streams</a>, and <a href="#">Kafka Streams</a></li> <li><a href="#">Lightbend Reactive Platform</a> for integrated microservices</li> <li>Integrated Machine Learning components, such as <a href="#">Kubeflow</a></li> <li><a href="#">Lightbend Cloudflow</a> (Q1, 2019), for accelerated development, deployment, and management of streaming pipeline applications</li> <li>Deployed on <a href="#">OpenShift</a>, and other <a href="#">Kubernetes</a> distributions (originally implemented on <a href="#">Mesosphere DC/OS</a>, a <a href="#">Apache Mesos</a> distribution)</li> <li>Commercial and OSS management and monitoring tools</li> <li>Supports cloud and on-premise deployments</li> </ul> </li> <li>GA (general availability) in October 2017 for DC/OS. V2.0 for OpenShift/ Kubernetes in December 2018. <i>Pipelines</i> introduced in May 2019</li> <li>I built and led the engineering teams that created the product</li> <li>I worked with Business Development colleagues on partner opportunities</li> <li>I worked with Marketing on Sales enablement</li> <li>I worked with Sales on team training and pre-sales engagements</li> <li>I worked with Professional Services on customer engagements and training</li> <li>I led product evangelism: conference talks, webinars, O'Reilly reports, white papers, and analyst briefings on the evolving fast-data landscape</li> <li>I contributed code to Spark, primarily in the area of Mesos integration</li> <li>I wrote <a href="#">Fast Data Architectures for Streaming Applications, Second Edition</a> (O'Reilly Report, December 2018 - first edition, November 2016)</li> <li>I wrote <a href="#">Programming Scala, Second Edition</a> (O'Reilly, December 2014)</li> <li>I was a member of the Program Committees for Strata Data + AI, 2014-2020, GOTO Chicago 2014-2020, Flink Forward 2019, Spark Summit 2017-2019, Scala Days 2015-2017, Reactive Summit 2016-2018, GOTO Aarhus and Copenhagen 2014, CodeMesh/TechMesh London 2013 - 2014, and Big Data Everywhere 2014</li> </ul>
<p><b>Owner and Principal Consultant</b> <a href="#">Concurrent Thought</a> USA April 2013 - Present</p>	<p>Consulting on big-data analytics with Hadoop, machine learning, and other tools, Functional Programming with Scala and other languages, Agile software development practices</p> <ul style="list-style-type: none"> <li>I mentored Cigna Insurance as they built out their first Hadoop clusters and implemented the first applications on them. Developed Scalding (Scala), Hive, and Java/Python MapReduce applications for analytics and machine learning at scale</li> <li>I mentored clients who were transitioning to Functional Programming using new languages, such as Scala, or older languages, such as Java, Ruby, and Javascript</li> <li>I mentored clients adopting Agile Software Development</li> <li>I was the co-organizer of the Chicago Hadoop Users Group</li> </ul>

<p><b>Principal Consultant</b>  <a href="#">Think Big Analytics</a>  International  April 2011 - April 2013</p>	<p>Consulting on “Big Data” Analytics with Hadoop and Related Tools</p> <ul style="list-style-type: none"> <li>• I founded <i>Think Big Academy</i>, the training division of Think Big Analytics. Developed and delivered courseware on the Hadoop ecosystem, MapReduce programming in Java and Scala (Scalding), Hive, and Pig</li> <li>• I implemented Hadoop-based data warehouse applications for clients in the fields of Internet services, genetics, e-commerce, and government</li> <li>• I wrote <a href="#">Functional Programming for Java Programmers</a> (O'Reilly, July 2011)</li> <li>• I co-wrote, <a href="#">Programming Hive</a> (O'Reilly, October 2012)</li> <li>• I created the open-source project, <a href="#">Stampede</a></li> <li>• I was a member of the Organizing Committee for OSCON 2011-2012, StrangeLoop 2011-2013, LambdaJam 2013, and GOTO Aarhus 2012</li> <li>• I co-organized the <i>Development Languages, Practices, and Techniques</i> “stage” at Agile 2011</li> <li>• I co-organized the FREECO @ Onward! 2011 : International Workshop on Free Composition</li> <li>• I was a <i>Cloudera Certified Hadoop Professional</i></li> </ul>
<p><b>Senior Software Engineer</b>  <a href="#">DRW Trading Group</a>  Chicago, IL  November 2009 - March 2011</p>	<p>Development of infrastructure software</p> <ul style="list-style-type: none"> <li>• I developed scalable, high-performance data collection and visualization applications for enterprise monitoring systems (Scala, JavaScript, Ruby, MongoDB)</li> <li>• I developed a high-performance, highly-reliable appliance for network traffic capture and analysis (Linux Kernel, C, Ruby, JavaScript)</li> <li>• I developed IT management and reporting applications (Ruby on Rails)</li> <li>• I was the co-guest editor for the <i>IEEE Software</i> special issue on “Multiparadigm Programming” (Sept./Oct. 2010)</li> <li>• I was a member of the organizing committee for <i>Commercial Users of Functional Programming</i> (Oct. 2010)</li> <li>• I co-organized “Scala Summit” at OSCON 2010 (July)</li> <li>• I was a visiting faculty member, Loyola University Chicago, where I taught <i>Pragmatics of Industrial Software Development</i> (Fall 2010)</li> </ul>
<p><b>Senior Trainer, Mentor, and Consultant</b>  <a href="#">Object Mentor</a>  Chicago, IL  July 2006 - October 2009</p>	<p>Training, mentoring, and consulting on Object-Oriented, Functional, and Aspect-Oriented Programming (OOP, FP, and AOP), Agile Methods, Scala, Enterprise Java, Ruby, C/C++, and C#</p> <ul style="list-style-type: none"> <li>• I co-wrote <a href="#">Programming Scala, First Edition</a> (O'Reilly, Sept. 2009)</li> <li>• I developed and delivered courseware and conference talks on OOP, FP, AOP, Test-Driven Development (TDD), Refactoring, Agile techniques, Scala, Java, C++, Ruby, Polyglot and Poly-paradigm Programming, and craftsmanship</li> <li>• I mentored clients on design, XP/agile methods, corporate agile transitions (<i>Agile in the Large</i>), Enterprise Java, C/C++, Ruby, Scala, and C#</li> <li>• I founded the <a href="#">Chicago-Area Scala Enthusiasts</a> (CASE) user group</li> </ul>

<p><b>Principal Consultant</b>  <a href="#">Aspect Research Associates</a>  USA  August 2005 - June 2006</p>	<p>Consultant on Aspect- and Object-Oriented Programming, Enterprise Java, Ruby on Rails, and Agile Methods</p> <ul style="list-style-type: none"> <li>• I was the architect and team lead for new services using the Spring Framework, Hibernate, and other lightweight enterprise Java technologies at an online advertising services provider in San Francisco, CA</li> <li>• I contributed to a <i>Ruby on Rails</i> portal project at a major automotive manufacturer</li> <li>• I mentored clients on Spring, AOP, and AspectJ</li> <li>• I contributed to the AspectJ standard library project</li> <li>• I spoke at several conferences on AOP and Ruby development</li> </ul>
<p><b>Directory of NCG Software Development</b>  <a href="#">BridgePort Networks</a>  Chicago, IL  September 2003 - August 2005</p>	<p>Built and directed the <b>Server Software Development Team</b> for BridgePort's <i>Network Convergence Gateway</i> (NCG), telecom SCP/VLR that integrates VoIP and other IP media with CDMA and GSM wireless networks</p> <ul style="list-style-type: none"> <li>• I built up the development team from 2 to 10 members</li> <li>• I ran Project Management for all BridgePort development teams, using <i>Scrum</i></li> <li>• I participated in business development and requirements gathering</li> <li>• I mentored the team on software process</li> <li>• I implemented Enterprise Java components and server tools</li> </ul>
<p><b>Site Owner and Editor</b>  <a href="#">Aspect Programming</a>  <a href="#">Polyglot Programming</a>  July 2003 - Present</p>	<p>Editor for advocacy web sites for Polyglot and Poly-paradigm Programming (PPP) and Aspect Oriented Programming/Software Development (AOP/AOSD)</p> <ul style="list-style-type: none"> <li>• I published conference talks and papers on PPP and AOP</li> <li>• I founded <a href="#">Contract4J</a>, a Java 5 and AspectJ tool that supports <i>Design by Contract</i> in Java</li> <li>• I founded <a href="#">Aquarium</a>, an AOP library for Ruby</li> </ul>
<p><b>Sr. Product Manager</b>  <a href="#">IBM/Rational Software</a>  Redmond, WA  January 2002 – August 2003</p>	<p>Senior Product Manager for the J2EE support in Rational XDE, a modeling and patterns-oriented development tool hosted in <a href="#">Eclipse</a></p> <ul style="list-style-type: none"> <li>• I specified feature set for J2EE and Java Web Services support in XDE</li> <li>• I participated in whole-product strategies for product evolution and other marketing activities</li> <li>• I worked with Rational and IBM customers and IBM to understand their development needs and to evolve XDE to support those needs</li> <li>• I researched AOP and advocated for AOP support in XDE</li> </ul>
<p><b>Software Architect</b>  <a href="#">Powerhouse Technology</a>  Seattle, WA  January 2001 - September 2001  (Predecessor of BridgePort Networks.)</p>	<p>Software Architect for Powerhouse's <i>Pinpoint</i> technology for routing wireless telephone calls over the Internet to WiFi-enabled handsets</p> <ul style="list-style-type: none"> <li>• I developed the network security architecture, utilizing IPSec, firewalls, proxies, etc.</li> <li>• I explored conflicts between Internet standards for Voice over IP (VoIP), security (IPSec), and Network Address Translation (NAT). Designed solutions</li> <li>• I participated in requirements discovery and definition</li> <li>• I developed J2EE based administration services and network architecture</li> <li>• I contributed to business-development and venture capital initiatives</li> </ul>

<p><b>Systems Design Engineer</b> Mercata Bellevue, WA</p> <p>November 1999 - December 2000</p>	<p>Led the <b>Advanced Development Team</b> that investigated and implemented new technologies for Mercata, to improve Mercata's e-commerce site and to support corporate objectives for new business initiatives</p> <ul style="list-style-type: none"> <li>I was the Team Lead for <b>Mercata Marketplace™</b>, a self-service portal for third-party sellers to offer <b>PowerBuys™</b> hosted by Mercata (analogous to auctions on eBay)</li> <li>I implemented and maintained Mercata's web site for shoppers using WAP phone and Palm™ devices, using the BroadVision One to One™ e-commerce platform</li> <li>I coauthored U.S. Patent applications for enhancements to Mercata's proprietary <i>Group Buying</i> technology</li> <li>I participated in business development initiatives with Wireless and Broadband partners</li> <li>I investigated Wireless and Interactive TV (iTV) technologies</li> </ul>
<p><b>Software Development Manager</b> Sequel Technology Corporation Bellevue, WA</p> <p>January 1999 - October 1999</p>	<p>Managed teams developing the user interface and Internet-Protocol (IP) monitoring and filtering technology for Sequel's <b>Internet Resource Manager™</b> (IRM)</p> <ul style="list-style-type: none"> <li>I led the team developing next-generation Java and web-based user interface</li> <li>I contributed to requirements discovery, system architecture and design</li> </ul>
<p><b>Software Architect</b> <i>Global Mobility Systems</i> (now part of OpenWave) Bellevue, WA</p> <p>April 1998 - January 1999</p>	<p>Project Lead and Architect for the second-generation <b>Mobility Operating Environment™</b> (MOE), a three-tier, client-server, web-based system for advanced wireless telecom services</p> <ul style="list-style-type: none"> <li>I participated in requirements discovery</li> <li>I implemented user-interface and server components in DHTML and Java</li> </ul>
<p><b>Staff Software Engineer</b> Applied Microsystems Corporation Redmond, WA</p> <p>February 1995 - April 1998</p>	<p>Project Lead and Architect for a new user interface for an existing source-level debugger product line</p> <ul style="list-style-type: none"> <li>I led requirements gathering, architecture, design, and implementation</li> <li>I developed a reusable C++ component framework for debugger-type applications based on the Galaxy Application Environment™ from Visix Software</li> <li>I designed a cross-platform user interface that supported Windows and X11/Motif design guidelines and exploited the principles of effective human-computer interaction (HCI)</li> <li>I promoted <i>use cases</i> as a tool for meeting software quality assurance (QA) goals</li> <li>I mentored other engineers in object-oriented (OO) methods</li> <li>I supervised a small development team</li> </ul>
<p><b>Software Engineer III</b> ATL Ultrasound, Inc. Bothell, WA</p> <p>June 1991 - February 1995</p>	<p>Developed user-interface and system-diagnostics software for real-time medical ultrasound system, the <b>Ultramark 2000™</b></p> <ul style="list-style-type: none"> <li>My team pioneered the use of object-oriented methods and C++ at ATL</li> <li>I promoted <i>design by contract</i> as a tool for improving software quality. Our team had only one bug reported against our subsystem in a three-year project.</li> <li>I developed diagnostic user interface "panels" for technicians, customers, and other non-technical users</li> <li>I developed C/C++ software for the VxWorks and iRMX operating systems and X11 user interfaces</li> </ul>
<p><b>Software Engineer</b> Technical Arts Corporation Redmond, WA</p> <p>January 1990 - April 1991</p>	<p>Developed user-interface, data-analysis, and system-control software for a real-time, three-dimensional scanning systems</p> <ul style="list-style-type: none"> <li>I pioneered the use of object-oriented design techniques at Technical Arts</li> <li>I implemented PL/M and C/C++ software for iRMX, UNIX V4.0, and DOS platforms</li> </ul>

## Technologies

<b>Executive Management</b>	<ul style="list-style-type: none"><li>• <b>Team Building, Management:</b> Created and led teams to develop <a href="#">Lightbend Fast Data Platform</a> and IBM Research <i>Accelerated Discovery Platform</i>. Took over leadership of IBM watsonx.ai Platform Engineering. I now coordinate the technical engineering and research workgroups in the <a href="#">AI Alliance</a>. Growth, culture development, and mentoring of globally-distributed development teams.</li><li>• <b>Product Conception, Strategy, and Creation:</b> Product evangelism strategy at Lightbend and Anyscale, including conference organization.</li><li>• <b>Product Management:</b> Developed the initial product strategy for Lightbend Fast Data Platform. Co-developed the product strategy for IBM Research Accelerated Discovery Platform. Collaborated with the Product Management, Marketing, Sales, Business Development, and Services teams to drive the corporate strategy.</li><li>• <b>Project Management:</b> <a href="#">XP</a>, <a href="#">Kanban</a>, <a href="#">Lean</a>, <a href="#">Scrum</a>, <a href="#">Test-Driven Development</a> (TDD), scaling Agile to large organizations, resource and people management, scheduling and planning.</li><li>• <b>Communications:</b> Recognized industry leader, published author, frequent conference and user group speaker and organizer.</li></ul>
<b>Software Development</b>	<ul style="list-style-type: none"><li>• <b>AI/ML:</b> 13+ years experience managing rapidly evolving technology stacks for AI/ML applications using tools such as <a href="#">Ray</a>, <a href="#">Hugging Face</a>, <a href="#">PyTorch</a>, and cloud environments. MLOps and application development responsibilities.</li><li>• <b>Kubernetes/OpenShift, Mesos, Hadoop, and Cloud Architectures for Fast Data Processing:</b> 13+ years of experience with <a href="#">Hadoop</a> and other Big Data technologies, 8 years experience with <a href="#">Kubernetes</a>, <a href="#">OpenShift</a>, <a href="#">Mesos</a>, and Cloud platforms <a href="#">AWS</a> and some <a href="#">Azure</a>. 12+ years experience in batch and streaming data, using <a href="#">Spark</a>, <a href="#">Flink</a>, <a href="#">Kafka</a>, <a href="#">Hive</a>, and microservice libraries, <a href="#">Akka Streams</a> and <a href="#">Kafka Streams</a>. Languages: <a href="#">Scala</a>, <a href="#">Python</a>, <a href="#">Java</a>, some <a href="#">Go</a> and <a href="#">Rust</a>, and *nix shells.</li><li>• <b>Data Analytics and Machine Learning:</b> 13+ years experience in <i>data science and engineering</i> organizations, for batch and streaming data applications.</li><li>• <b>Distributed, “Reactive” Programming:</b> 10+ years experience building distributed applications, most recently with <a href="#">Scala</a>, <a href="#">Akka</a>, <a href="#">Kubernetes</a>, and <a href="#">Ray</a>.</li><li>• <b>Functional Programming:</b> 15+ years of experience using Scala. Some knowledge of Clojure, Haskell, Erlang, and Scheme.</li><li>• <b>Aspect-Oriented Programming:</b> Pioneering work on applications of AOP to the full development life cycle. Founder of <a href="#">Aquarium</a>, an open-source AOP toolkit for Ruby and <a href="#">Contract4J</a> for <i>Design by Contract</i> in Java.</li><li>• <b>Object-Oriented Programming:</b> Design and programming using OOP languages: Scala, Python, Java, JavaScript, Ruby, and C++.</li><li>• <b>Software Life-cycle:</b> <a href="#">XP</a>, <a href="#">Kanban</a>, <a href="#">Lean</a>, <a href="#">Scrum</a>, <a href="#">Test-Driven Development</a> (TDD), and Scaling Agile methods to Large Organizations.</li><li>• <b>Languages:</b> Scala, Python, Java, Bash, Zsh, Ruby, C/C++, and *nix tools. Web tools: JavaScript, HTML, CSS. Some Go, Rust, Mojo, Clojure, Scheme, and Perl.</li><li>• <b>Data Stores:</b> Hadoop, SQL and NoSQL databases.</li><li>• <b>Cloud Platforms:</b> <a href="#">AWS</a> and some <a href="#">Azure</a> and <a href="#">IBM Cloud</a>.</li></ul>



## Publications

<a href="#">Scala 3</a>	A blog series on Medium, 2020-2024
<a href="#">Programming Scala, Third Edition</a>	O'Reilly, June 2021 (second edition, December 2014, first edition, September 2009)
<a href="#">Hardware &gt; Software &gt; Process</a>	A report co-authored with Paco Nathan for NVIDIA on the importance of hardware awareness when writing data-intensive applications. Manning, June 2021
<a href="#">97 Things Every Data Engineer Should Know</a>	Contributed a chapter called “Streaming Is Different from Batch”. O'Reilly Learning Platform, June 2021
<a href="#">What Is Ray?</a>	O'Reilly, September 2020
<a href="#">Scaling Python Processing with Ray</a>	O'Reilly Learning Platform, July 2020
<a href="#">97 Things Every Java Programmer Should Know</a>	Contributed a chapter called “Embrace SQL Thinking”. O'Reilly Learning Platform, May 2020
<a href="#">Fast Data Architectures for Streaming Applications, Second Edition</a>	O'Reilly Report, October 2018 (first edition, October 2016)
<a href="#">Programming Hive</a>	(with Ed Capriolo and Jason Rutherglen) O'Reilly, October 2012
<a href="#">Functional Programming for Java Programmers</a>	O'Reilly, July 2011
IEEE Internet Computing, The Functional Web	Guest author for <i>The Functional Web</i> column, “Scala Web Frameworks: Looking Beyond Lift” (Sept./Oct. 2011)
IEEE Software	Co-guest editor of the special issue on “ <a href="#">Multiparadigm Programming</a> ” (Sept./Oct. 2010)
<a href="#">Clean Code</a>	“Clean Systems” chapter of Robert Martin's <i>Clean Code</i> book
<a href="#">Accelerating automation of digital health applications via cloud native approach</a>	Experience report from building <i>digital health</i> applications on IBM's <a href="#">Accelerated Discovery Platform</a> .
<a href="#">oreillynnet.com</a>	<ul style="list-style-type: none"> <li>• <a href="#">Cat Fight in a Pet Store: J2EE vs. .NET</a></li> <li>• <a href="#">A Pet Market with Flash</a></li> </ul>
<a href="#">polyglotprogramming.com</a> <a href="#">aspectprogramming.com</a> <a href="#">aquarium.rubyforge.org</a>	<ul style="list-style-type: none"> <li>• <a href="#">Contract4J: Design by Contract for Java</a></li> <li>• <a href="#">Aquarium: AOP for Ruby</a></li> <li>• <a href="#">Use Cases as Aspects</a></li> </ul>
IBM <a href="#">developerWorks</a>	<ul style="list-style-type: none"> <li>• <a href="#">AOP@Work: Component Design with Contract4J</a></li> </ul>

## Public Speaking

<b>AI Camp Chicago, February 2024</b>	<ul style="list-style-type: none"> <li>• <a href="#">AI in the Open: Why It Matters. How to Achieve It.</a></li> </ul>
<b>Scale by the Bay, November 2023</b>	<ul style="list-style-type: none"> <li>• <a href="#">Open Source Science vs. Open Source Software: What's Different? What's the Same?</a></li> </ul>
<b>IEEE Services, July 2023</b>	<ul style="list-style-type: none"> <li>• <a href="#">Plenary Panel: Open Source Science</a></li> </ul>
<b>GOTO Chicago, May 2023</b>	<ul style="list-style-type: none"> <li>• <a href="#">Reinforcement Learning - ChatGPT, Playing Games, and More</a></li> </ul>
<b>Data Day Texas, January 2023</b>	<ul style="list-style-type: none"> <li>• <a href="#">Reinforcement Learning with Ray RLlib</a></li> </ul>
<b>YOW! Lambda Jam, May 2022</b>	<ul style="list-style-type: none"> <li>• <a href="#">Lessons Learned from 15 Years of Scala in the Wild</a> (video and slides)</li> </ul>
<b>Detroit Tech Watch, March 2022</b>	<ul style="list-style-type: none"> <li>• <a href="#">Copious Data: the “Killer App” for Functional Programming</a></li> </ul>
<b>Functional Conf 2022, March 2022</b>	<ul style="list-style-type: none"> <li>• <a href="#">Lessons Learned from 15 Years of Scala in the Wild</a> (video)</li> </ul>
<b>ACM Chicago, December 2021</b>	<ul style="list-style-type: none"> <li>• <a href="#">Reinforcement Learning with Ray RLlib</a></li> </ul>
<b>Scale by the Bay, October 2021</b>	<ul style="list-style-type: none"> <li>• <a href="#">Lessons Learned from 15 Years of Scala in the Wild</a> (video)</li> </ul>
<b>GOTO Unscripted, September 2021</b>	<ul style="list-style-type: none"> <li>• <a href="#">Is Machine Learning a Black Box</a></li> </ul>



## Public Speaking

Scala in the City, July 2021	<ul style="list-style-type: none"> <li>Exploring “inline” in Scala 3</li> </ul>
Denver CTO Club, May 2021	<ul style="list-style-type: none"> <li><a href="#">Next Generation AI - Towards Widespread Enterprise Adoption</a></li> </ul>
Philadelphia Scala Meetup, April 2021	<ul style="list-style-type: none"> <li><a href="#">What’s New with Scala 3?</a></li> </ul>
Scala Love in the City, February 2021	<ul style="list-style-type: none"> <li><a href="#">A Tour of Contextual Abstractions in Scala 3</a></li> </ul>
SF and Chicago Scala Meetups, November 2020	<ul style="list-style-type: none"> <li><a href="#">What’s New with Scala 3?</a></li> </ul>
CodeMesh 2020 and Scale by the Bay 2020, November 2020	<ul style="list-style-type: none"> <li><a href="#">Ray: A System for High-performance, Distributed</a></li> </ul>
Meet the Expert, October 2020	<ul style="list-style-type: none"> <li><a href="#">Scaling ML/AI Applications with Ray</a></li> </ul>
NLP Summit, October 2020	<ul style="list-style-type: none"> <li><a href="#">Ray for Natural Language Processing</a></li> </ul>
Chicago Cloud Conference, September 2020	<ul style="list-style-type: none"> <li><a href="#">Reinforcement Learning with Ray RLlib</a></li> </ul>
PISummit, August 2020	<ul style="list-style-type: none"> <li>Panel: How to create your own open source software and community</li> </ul>
YOW! Data, June 2020	<ul style="list-style-type: none"> <li><a href="#">Cluster-wide Scaling of Machine Learning with Ray</a></li> </ul>
Spark + AI Summit, June 2020	<ul style="list-style-type: none"> <li><a href="#">Ray: Enterprise-Grade, Distributed Python</a></li> </ul>
MLOps: Production and Engineering World, June 2020	<ul style="list-style-type: none"> <li><a href="#">Ray and how it enables easier DevOps</a></li> </ul>
Global STAC Live, June 2020	<ul style="list-style-type: none"> <li><a href="#">Panel: Making Your Analytics More Agile</a></li> </ul>
AICamp, May 2020	<ul style="list-style-type: none"> <li><a href="#">Highly-scalable RL Library for Real-world Applications</a></li> </ul>
Scala in the City, May 2020	<ul style="list-style-type: none"> <li><a href="#">Modularity: A Retrospective</a></li> </ul>
PyCon USA, GOTO Chicago, ChiPy, and SFPython (all online), April 2020	<ul style="list-style-type: none"> <li><a href="#">Ray: A System for High-performance, Distributed Python Applications</a> (talk)</li> </ul>
ODSC Boston & EU (online), 2020	<ul style="list-style-type: none"> <li><a href="#">Ray: A System for High-performance, Distributed Python Applications</a> (tutorial)</li> </ul>
Milwaukee Big Data, March 2020	<ul style="list-style-type: none"> <li><a href="#">Ray: A System for High-performance, Distributed Python Applications</a> (talk)</li> </ul>
GOTO Nights Chicago, February 2020	<ul style="list-style-type: none"> <li><a href="#">Modularity: A Retrospective</a></li> </ul>
AIconf San Jose, Strata Data San Francisco, London, and NYC: 2019	<ul style="list-style-type: none"> <li><a href="#">Hands-on Machine Learning with Kafka-based Streaming Pipelines</a> (tutorial)</li> </ul>
Strata Data San Francisco, London, and NYC: 2019	<ul style="list-style-type: none"> <li><a href="#">Executive Briefing: What it takes to use machine learning in fast data pipelines</a></li> </ul>
Strata Data London: 2018	<ul style="list-style-type: none"> <li><a href="#">Executive Briefing: What You Need to Know about Fast Data</a></li> </ul>
Strata Data San Jose, YOW! Australia 2018, BigDataLDN, Scala Days NYC	<ul style="list-style-type: none"> <li><a href="#">Streaming Microservices with Akka Streams and Kafka Streams</a> (talk)</li> </ul>
Strata Data San Jose, London, and NYC, O’Reilly Software Architecture Conference NYC: 2018	<ul style="list-style-type: none"> <li><a href="#">Streaming Microservices with Akka Streams and Kafka Streams</a> (tutorial)</li> </ul>
GOTO Chicago: 2018	<ul style="list-style-type: none"> <li><a href="#">Bash and All That; Why Ancient *NIX Tools Are Still Essential</a></li> </ul>
Strata Data London and NYC, GOTO Chicago, Reactive Summit, Scale by the Bay, Big Data LDN, ScalaIO, O’Reilly Software Architecture Conference NYC: 2017, YOW! Data 2018	<ul style="list-style-type: none"> <li><a href="#">Stream All the Things!</a></li> </ul>

## Public Speaking

<b>Strata + Hadoop World London 2017</b>	<ul style="list-style-type: none"> <li>• <a href="#">Scala and JVM for Big Data: Lessons from Spark</a></li> </ul>
<b>Mesoscon North America 2017</b>	<ul style="list-style-type: none"> <li>• <a href="#">Streaming Data Pipelines on Mesos - Lessons Learned</a></li> </ul>
<b>Strata Data San Jose 2017</b>	<ul style="list-style-type: none"> <li>• <a href="#">Just Enough Scala for Spark</a> (tutorial)</li> </ul>
<b>O'Reilly Software Architecture Conference San Francisco 2016</b>	<ul style="list-style-type: none"> <li>• <a href="#">An Architecture for Merging Fast Data and Enterprise Applications - The SMACK Stack</a></li> </ul>
<b>Strata Data NYC, and Singapore, Spark Summit EU: 2016</b>	<ul style="list-style-type: none"> <li>• <a href="#">Just Enough Scala for Spark</a> (tutorial)</li> </ul>
<b>Spark Summit 2016</b>	<ul style="list-style-type: none"> <li>• <a href="#">Spark on Mesos: the State of the Art</a> (with Tim Chen)</li> </ul>
<b>Strata + Hadoop World London 2016</b>	<ul style="list-style-type: none"> <li>• <a href="#">Scala: The Unpredicted Lingua Franca for Data Science</a> (with Andy Petrella)</li> </ul>
<b>Scala Days New York and Berlin 2016</b>	<ul style="list-style-type: none"> <li>• <a href="#">Scala: The Unpredicted Lingua Franca for Data Science</a> (with Andy Petrella)</li> </ul>
<b>Strata + Hadoop World San Jose 2016</b>	<ul style="list-style-type: none"> <li>• <a href="#">Scala and JVM for Big Data: Lessons from Spark</a></li> </ul>
<b>YOW! Brisbane and Sydney 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Scala and JVM for Big Data: Lessons from Spark</a></li> <li>• <a href="#">Spark Crash Course</a></li> </ul>
<b>Big Data Techcon Chicago 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Spark Tutorial</a></li> <li>• <a href="#">Spark on Mesos</a></li> <li>• <a href="#">Why Spark Is the Next Top (Compute) Model</a></li> </ul>
<b>Strata + Hadoop World NYC 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Spark on Mesos</a> (with Tim Chen)</li> </ul>
<b>Scala World 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Scala and JVM for Big Data: Lessons from Spark</a></li> </ul>
<b>Scala By The Bay 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Keynote: Data Science at Scale with Spark</a></li> </ul>
<b>Spark Summit 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Spark on Mesos - A Deep Dive</a> (with Tim Chen)</li> </ul>
<b>Scala Days Amsterdam 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Why Spark Is the Next Top (Compute) Model</a></li> </ul>
<b>GOTO Chicago 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Data Science at Scale with Spark</a></li> </ul>
<b>Strata + Hadoop World London 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Spark on Mesos</a></li> </ul>
<b>O'Reilly Software Architecture Conference 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Reactive Systems: The Why and the What</a></li> <li>• <a href="#">Error Handling in Reactive Systems</a></li> </ul>
<b>Scala Days San Francisco 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">The Unreasonable Effectiveness of Scala for Big Data</a></li> </ul>
<b>Strata + Hadoop World San Jose 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">Why Spark Is the Next Top (Compute) Model</a></li> </ul>
<b>Northeast Scala Symposium 2015</b>	<ul style="list-style-type: none"> <li>• <a href="#">We Won! How Scala Conquered Big Data</a></li> </ul>
<b>Scala eXchange 2014</b>	<ul style="list-style-type: none"> <li>• <a href="#">Why Scala Is Taking Over the Big Data World</a></li> </ul>
<b>React San Francisco 2014</b>	<ul style="list-style-type: none"> <li>• <a href="#">Error Handling in Reactive Systems</a></li> </ul>
<b>CodeMesh 2014</b>	<ul style="list-style-type: none"> <li>• <a href="#">SQL Strikes Back! Recent Trends in Data Persistence and Analysis</a></li> </ul>
<b>Big Data Techcon Boston and San Francisco 2014</b>	<ul style="list-style-type: none"> <li>• <a href="#">Copious Data: the "Killer App" for Functional Programming</a></li> <li>• H2O for Fast Data Analytics</li> <li>• Spark Streaming</li> <li>• <a href="#">Spark Tutorial</a></li> <li>• <a href="#">Scalding Tutorial</a></li> <li>• Factorie (Machine Learning) Tutorial</li> </ul>
<b>GOTO Aarhus and Copenhagen 2014</b>	<ul style="list-style-type: none"> <li>• <a href="#">Deep Dive into the Big Data Landscape</a> (video)</li> </ul>

## Public Speaking

<b>ScalaDays 2014</b>	<ul style="list-style-type: none"> <li>• <a href="#">Why Scala Is Taking Over the Big Data World</a></li> </ul>
<b>Philly ETE 2014, Big Data Everywhere Chicago 2014, Various User Groups</b>	<ul style="list-style-type: none"> <li>• <a href="#">Why Spark is the Next Top (Compute) Model</a></li> </ul>
<b>LambdaJam Chicago 2014</b>	<ul style="list-style-type: none"> <li>• <a href="#">Reactive Design: A Critique of Current Techniques</a></li> <li>• <a href="#">Spark Tutorial</a></li> </ul>
<b>React London 2014, LambdaJam Chicago 2014 and YOW! LambdaJam 2014</b>	<ul style="list-style-type: none"> <li>• <a href="#">Reactive Design: A Critique of Current Techniques (video)</a></li> </ul>
<b>CodeMesh 2013</b>	<ul style="list-style-type: none"> <li>• <a href="#">What's Ahead for Big Data (video)</a></li> </ul>
<b>GOTO Aarhus 2013</b>	<ul style="list-style-type: none"> <li>• <a href="#">From Big Data to Big Information (video)</a></li> </ul>
<b>LambdaJam 2013</b>	<ul style="list-style-type: none"> <li>• <a href="#">Copious Data: the "Killer App" for Functional Programming</a></li> </ul>
<b>GOTOChicago 2013</b>	<ul style="list-style-type: none"> <li>• <a href="#">What's Ahead for Big Data (video)</a></li> <li>• <a href="#">The Seductions of Scala (Tutorial)</a></li> </ul>
<b>Big Data Techcon Boston 2013</b>	<ul style="list-style-type: none"> <li>• <a href="#">Beyond MapReduce</a></li> <li>• <a href="#">Scalding for Hadoop</a></li> <li>• Machine Learning Crash Course (Tutorial)</li> <li>• Hive for Hadoop Data Warehousing (Tutorial)</li> </ul>
<b>TechMesh London 2012</b>	<ul style="list-style-type: none"> <li>• <a href="#">Beyond MapReduce</a></li> <li>• <a href="#">The Seductions of Scala (Tutorial)</a></li> </ul>
<b>StrangeLoop 2012</b>	<ul style="list-style-type: none"> <li>• <a href="#">Workshop on Scalding</a></li> </ul>
<b>Strata Conferences 2012 &amp; 2013, Santa Clara and NYC</b>	<ul style="list-style-type: none"> <li>• Hive for Hadoop Data Warehousing (Tutorial)</li> </ul>
<b>QCon NYC 2012</b>	<ul style="list-style-type: none"> <li>• <a href="#">MapReduce and Its Discontents</a></li> </ul>
<b>WindyCityDB 2012</b>	<ul style="list-style-type: none"> <li>• Programming Hive Tutorial</li> </ul>
<b>Northeast Scala Symposium 2012</b>	<ul style="list-style-type: none"> <li>• <a href="#">Why Big Data Needs to Be Functional</a></li> </ul>
<b>FREECO Workshop, Onward 2011</b>	Co-organizer.
<b>CME Technology Conference 2011</b>	<ul style="list-style-type: none"> <li>• Keynote: <a href="#">Heresies and Dogmas in Software Development</a></li> </ul>
<b>StrangeLoop 2011</b>	<ul style="list-style-type: none"> <li>• <a href="#">Heresies and Dogmas in Software Development</a></li> <li>• Moderator: Programming Languages Panel.</li> </ul>
<b>Agile 2011</b>	<ul style="list-style-type: none"> <li>• <a href="#">How Functional Programming Changes Developer Practices</a></li> <li>• "Stage" Co-producer, <i>Development Languages, Practices, and Techniques</i>.</li> </ul>
<b>OSCON 2011</b>	<ul style="list-style-type: none"> <li>• <a href="#">Become a Better Developer with Functional Programming</a> (1/2 day tutorial)</li> <li>• Committee member: OSCON Java</li> </ul>
<a href="#">Pragmatics of Industrial Software Development</a>	COMP 388-003, 488-00, Fall 2010, Loyola University, Chicago.
<b>OSCON 2010</b>	<ul style="list-style-type: none"> <li>• The Seductions of Scala (1/2 day tutorial)</li> <li>• Co-organizer: Scala Summit (1-day of Scala talks)</li> </ul>
<b>Commercial Users of Functional Programming 2010</b>	Organizing committee

## Public Speaking

<b>Erlang Factory 2010</b>	<ul style="list-style-type: none"> <li>• <a href="#">Scala for Erlang Programmers</a></li> </ul>
<b>StrangeLoop 2010</b>	<ul style="list-style-type: none"> <li>• <a href="#">The Seductions of Scala</a></li> <li>• Scalable Concurrent Applications with Akka and Scala</li> </ul>
<b>StrangeLoop 2009</b>	<ul style="list-style-type: none"> <li>• Better Ruby through Functional Programming</li> <li>• Polyglot and Polyparadigm Programming for Better Agility</li> </ul>
<b>ICSE 2007</b>	<ul style="list-style-type: none"> <li>• Aspect Oriented Design for Java, AspectJ, and Ruby (full day tutorial)</li> </ul>
<b>OOPSLA 2007</b>	<ul style="list-style-type: none"> <li>• Aspect Oriented Design for Java and AspectJ (1/2 day tutorial)</li> </ul>
<b>Aspect-Oriented Software Development Conference 2006 - 2008</b>	<ul style="list-style-type: none"> <li>• <a href="#">Aquarium: AOP for Ruby</a> (2008)</li> <li>• <a href="#">An Aspect-Oriented Perspective on Object-Oriented Design</a> (2007)</li> <li>• <a href="#">The Challenges of Writing Reusable and Portable Aspects in AspectJ: Lessons from Contract4J</a> (2006)</li> <li>• <a href="#">Contract4J for Design by Contract in Java: Design Pattern-Like Protocols and Aspect Interfaces</a> (2006)</li> <li>• Aspect Oriented Design for Java, AspectJ, and Ruby (1/2 and full-day tutorials, 2006-2007)</li> </ul>
<b>RubyConf 2008</b>	<ul style="list-style-type: none"> <li>• <a href="#">Better Ruby Through Functional Programming</a> (video)</li> </ul>
<b>QCon San Francisco 2008 - 2009</b>	<ul style="list-style-type: none"> <li>• Radical Simplification Through Polyglot and Poly-paradigm Programming (<a href="#">video</a>, <a href="#">slides</a> - 2008)</li> <li>• The Seductions of Scala (full day tutorial - 2009)</li> </ul>
<b>JavaOne 2009</b>	<ul style="list-style-type: none"> <li>• <a href="#">Don't Do This! How Not to Write Java Software</a></li> </ul>
<b>Agile 2007 - 2008</b>	<ul style="list-style-type: none"> <li>• Ruby's Secret Sauce: Metaprogramming (1/2 day tutorial - 2007)</li> <li>• <a href="#">Clean Systems: Clean Code at the Architecture Level</a> (2008)</li> <li>• <a href="#">The Seductions of Scala</a> (2009)</li> <li>• <a href="#">Acceptance Testing Java Applications with Cucumber, RSpec, and JRuby</a> (2009)</li> </ul>
<b>SD West 2007 - 2009</b>	<ul style="list-style-type: none"> <li>• The Seductions of Scala (Tutorial - shorter version <a href="#">here</a> , 2009)</li> <li>• <a href="#">Better Ruby Through Functional Programming</a> (2009)</li> <li>• <a href="#">Polyglot and Poly-Paradigm Programming</a> (2008)</li> <li>• <a href="#">Aspect-Oriented Programming in Ruby</a> (2008)</li> <li>• Aspect-Oriented Design and Programming in Ruby (2007)</li> </ul>
<b>SD Best Practices 2008</b>	<ul style="list-style-type: none"> <li>• Principles of Ruby Application Design (1/2 day tutorial)</li> </ul>
<b>Architecture and Design World 2006 - 2008</b>	<ul style="list-style-type: none"> <li>• <a href="#">Ruby Application Design</a> (2008)</li> <li>• Aspect-Oriented Design in Ruby (2007)</li> <li>• Aspects in Dynamic Languages (2006)</li> <li>• Architecture Best Practices for Ruby Applications in a Java World (2006)</li> </ul>
<b>Chicago ACM</b>	<ul style="list-style-type: none"> <li>• <a href="#">Polyglot and Poly-paradigm Programming</a> (March 2010)</li> </ul>
<b>WindyCityRails 2009</b>	<ul style="list-style-type: none"> <li>• (Son of) Better Ruby Through Functional Programming (<a href="#">video</a>, <a href="#">slides</a> )</li> </ul>
<b>Chicago Polyglot Programmers Group</b>	<ul style="list-style-type: none"> <li>• <a href="#">Polyglot and Poly-paradigm Programming</a> (May 2008)</li> <li>• <a href="#">The Seductions of Scala</a> (Oct 2008)</li> </ul>
<b>Chicago Ruby Users Group</b>	<ul style="list-style-type: none"> <li>• <a href="#">Aquarium: AOP for Ruby</a> (Oct. 2007)</li> </ul>

## Public Speaking

<b>Chicago Java Users Group</b>	<ul style="list-style-type: none"><li>• <a href="#">Aspect-Oriented Programming and Design for Java and AspectJ</a> (Oct. &amp; Dec. 2007)</li><li>• <a href="#">The Seductions of Scala</a> (Dec. 2008)</li></ul>
<b>DePaul Univ. Computer Science Group, Oct. 2007</b>	<ul style="list-style-type: none"><li>• <a href="#">AOP in Academia and Industry</a></li></ul>
<b>developerWorks Live 2003</b>	<ul style="list-style-type: none"><li>• Model-Driven Development of J2EE Applications - A Practical Guide</li></ul>
<b>JBossTwo Conf. 2003</b>	<ul style="list-style-type: none"><li>• Panel on the future of Aspect Oriented Programming</li></ul>

## Education

<b>Ph.D., Theoretical Physics</b> University of Washington 1989	<ul style="list-style-type: none"><li>• Studied rare decay processes in atoms and nuclei</li><li>• Developed numerical models of these processes using object-based methods and VAX FORTRAN</li></ul>
<b>MS, Theoretical Physics</b> University of Virginia 1985	<ul style="list-style-type: none"><li>• Studied the structure of protons and neutrons in atomic nuclei</li></ul>
<b>BS, Physics</b> University of Virginia 1982	<ul style="list-style-type: none"><li>• Minor in Mathematics</li></ul>