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Education

Oct. 1977–Nov. 1978 & Jan. 1980–Oct. 1981	University of Oxford, England. D.Phil. in Computation from Programming Research Group. Advisor: Professor C.A.R. Hoare. Awarded three-year Studentship from Science Research Council. Thesis – *Exception Handling: The Case Against*.
Oct. 1974 – June 1977	University of East Anglia, Norwich, England. B.Sc. with First Class Honours in Computing Studies.

Employment

Jan.–Mar 2018	Visiting Professor, School of Engineering and Computer Science, Victoria University of Wellington, New Zealand. Host: James Noble
Sep.–Dec 2017	Visiting Researcher, RMoD Group, Inria, Université de Lille, France. Host: Stéphane Ducasse
Apr.–Jun 2011	Visiting Professor, School of Informatics, Univiersity of Edinburgh. Host: Prof. Phil Wadler
Jan.–Mar. 2011	Visiting Researcher, Microsoft Research Laboratory, Cambridge, UK. Host: Simon Peyton-Jones.
July 2008–Dec 2008	Consultant to Fortress Group, Sun Laboratories, Burlington, Massachusetts.
Sep. 2004–Present	Professor, Department of Computer Science, Portland State University, Portland, Oregon
Apr. 2002–July 2002	Consultant to Intel Research, Seattle, Washington.
Sep. 2001–Dec. 2001	Gast-Professor, Software Composition Group, University of Bern, Switzerland. Host: Prof. Oscar Nierstrasz.
Jan. 2000–June 2006	Professor, Department of Computer Science & Engineering, OGI School of Science & Engineering, Oregon Health & Science University (formerly Oregon Graduate Institute).
Jul. 1994–Dec. 1999	Professor and Head of Department, Department of Computer Science and Engineering, Oregon Graduate Institute. I doubled enrollments in our educational programs and founded, in collaboration with three state Universities, the Oregon Master of Software Engineering degree program. Concurrently, we in-

	creased per-capita research income, hired 12 new faculty members, and moved the department into a new building.
Oct. 1998–Dec. 1998	Consultant to Aspect-oriented Programming Group, Xerox Palo Alto Research Center. Gregor Kiczales, Manger.
Aug. 1989– June 1994	Member of Research Staff, Cambridge Research Laboratory, Digital Equipment Corporation. Research and internal consulting on Object Oriented Languages, type systems, RPC, network services, object models, object brokering, high-bandwidth file systems, and system management. Convinced e-commerce group to move to the World-wide Web.
Sep. 1991–June 1993	Adjunct professor in the computer science department of Harvard University (Division of Applied Sciences). Taught graduate operating systems course, helped organize graduate seminar on types.
Dec.1986–Aug. 1989	Member of Technical Staff, Distributed Systems Advanced Development Group, Digital Equipment Corporation (Littleton). Created, hired led and managed a small group that built a distributed object system on Unix using a conventional programming language and RPC. Designed and patented an object location algorithm to scale to a world-wide network of over 30 000 nodes, and prototyped an expense voucher application on this system.
Nov. 1981–Dec. 1986	Research Assistant Professor, University of Washington, Department of Computer Science. Taught classes, supervised graduate students and research assistants, and conducted research related to various aspects of distributed system and applications. Investigated the accommodation of heterogeneous hardware and software into an existing environment.
Nov. 1978–Dec. 1979	IBM T.J. Watson Research Center, Yorktown Heights, New York. Special Assistant, Software Technology Project (while a student at Oxford). Investigated the use of formally defined abstract data types. Wrote an interpreter for axiom systems and helped design a programming language that supported ADTs.
Summer 1975 & Jan.–Aug. 1974	Programmer, Thames Polytechnic Computer Centre, London. Wrote the command language interpreter for an experimental operating system, installed and maintained the Algol 68 compiler, and advised users of the centre on programming problems.

Publications

Fully refereed papers (those refereed by a journal editorial board or the program committee of a significant conference that I deem at or above the level of a journal publications.)

1. J Delplanque, S Ducasse, G Polito, AP Black, A Etien. Rotten Green Tests. In 2019 IEEE/ACM 41st International Conference on Software Engineering (ICSE), pp 500–511

2. J Noble, AP Black, KB Bruce, M Homer, T Jones. Grace's Inheritance. Journal of Object Technology 16 (2) 2017

3. J Noble, AP Black, KB Bruce, M Homer, MS Miller. The left hand of equals. Proceedings of the 2016 ACM International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software (ONWARD!) 2016, pp 224–237

4. F Alexander, AP Black. The performance of object encodings in JavaScript. Proceedings of the 11th Workshop on Implementation, Compilation (ICOOOLPS '16), 2016

5. Andrew P. Black, Kim B. Bruce, and James Noble. The Essence of Inheritance. In LNCS vol 9600 *A list of successes that can change the world*, Lindley, McBride, Sannella and Trinder (eds). pp.73–94. 2016.

6. M Homer, T Jones, J Noble, KB Bruce, and AP Black. Graceful dialects. Proc ECOOP 2014 — 28th European Conf. on Object-Oriented Programming, LNCS 8586, pp 131–156 (2014) (27% acceptance rate)

7. AP Black. Object-oriented programming: Some history, and challenges for the next fifty years. Information and Computation 231, pp 3–20 (2013)

8. E Murphy-Hill, T Barik, and AP Black. Interactive ambient visualizations for soft advice Information Visualization 12(*2*)pp 107–132 (2013)

9. AP Black, KB Bruce, M Homer, J Noble, A Ruskin and R Yannow. Seeking Grace: a new object-oriented language for novices. *Proc 44th ACM technical symposium on Computer science education*. pp 129–134 (2013) (38% acceptance rate)

10. Black, A. P., Bruce, K. B., Homer, M., and Noble, J. 2012. Grace: the absence of (inessential) difficulty. In Onward! '12: Proceedings 12th SIGPLAN Symp. on New Ideas in Programming and Reflections on Software. ACM, New York, NY, 85–98. (30% acceptance rate)

11. Emerson R. Murphy-Hill and Andrew P. Black. Programmer-friendly refactoring errors. *IEEE Trans. Software Eng.* **38**(*6*): pp 1417–1431 (2012)

12. Emerson R. Murphy-Hill, Chris Parnin and Andrew P. Black: How We Refactor, and How We Know It. *IEEE Trans. Software Eng.* **38**(*1*): pp 5–18 (2012)

13. Jeff Epstein, Andrew P. Black and Simon L. Peyton Jones: Towards Haskell in the cloud. Haskell Symposium 2011, pp. 118–129

14. Emerson R. Murphy-Hill, Moin Ayazifar, Andrew P. Black: Restructuring software with gestures. IEEE Symposium on Visual Languages and Human-Centric Computing, (VL/HCC 2011). September 2011, pp. 165–172. (33% acceptance rate)

15. Emerson Murphy-Hill and Andrew P. Black. An interactive ambient visualization for code smells. SOFTVIS '10: Proceedings of the 5th international symposium on Software visualization. October 2010. (Received best paper award). (36% acceptance rate)

16. Daniel Vainsencher and Andrew P. Black. A Pattern Language for Extensible Program Representation. *Transactions on Pattern Languages of Programming* **1**, LNCS 5770, pp. 1–47, 2009.

17. Emerson Murphy-Hill, Chris Parnin, and Andrew P. Black. *How we refactor, and how we know it*. May 2009. ICSE '09: Proceedings of the 2009 IEEE 31st International Conference on Software Engineering. (Winner of ACM SIGSOFT Distinguished Paper Award).

18. Emerson Murphy-Hill and Andrew P. Black. Refactoring Tools: Fitness for Purpose. *IEEE Software*. Sept.–Oct. 2008, Volume: 25, Issue: 5, pp 38–44.

19. Emerson Murphy-Hill and Andrew P. Black. Breaking the Barriers to Successful Refactoring: Observations and Tools for Extract Method. International Conference on Software Engineering, May 2008, Leipzig, Germany. IEEE Computer Society and ACM Press. pp. 421–430

20. Chuan-Kai Lin and Andrew P. Black. DirectFlow: a Domain-Specific Language for Information-Flow Systems. Proceedings of European Conference on Object-Oriented Programming, Berlin, July 2007. LNCS Vol 4609, pp 229–332.

21. Stéphane Ducasse, Oscar Nierstrasz, Nathanael Schärli, Roel Wuyts, and Andrew P Black. Traits: A Mechanism for Fine-grained Reuse. *ACM Transactions on Programming Languages and Systems (TOPLAS)* **28** *2*, March 2006. pp. 331–388 ACM Press.

22. Emerson R. Murphy-Hill, Philip J. Quitslund, and Andrew P. Black. Practitioner reports: Removing duplication from java.io: a case study using Traits. Companion to the 20th annual ACM SIGPLAN conference on Object-oriented Programming Systems, Languages and Applications (OOPSLA '05). October 2005, pp. 282–291

23. Nathanael Schärli, Andrew P. Black and Stéphane Ducasse. Object Encapsulation for Dynamically Typed Languages. Conference on Object Oriented Programming Systems Languages and Applications (OOPSLA '04), Vancouver, BC, October 2004, pp. 130–149.

24. Emerson Murphy-Hill and Andrew P. Black. Traits: Experience with a Language Feature. Companion to the 19th annual ACM SIGPLAN conference on Object-oriented programming systems, languages, and applications, October 2004, Vancouver, BC, CANADA. pp. 275–282

25. Andrew P. Black and Nathanael Schärli. Traits: Tools and Methodology. International Conference on Software Engineering (ICSE), May 2004, Edinburgh, Scotland. pp. 676–686.

26. Nathanael Schärli and Andrew P. Black. A Browser for Incremental Programming. Computer languages, Systems and Structures, vol 30 Nr 1–2, pp. 79–95, April–July 2004.

27. Andrew P. Black. Post-Javaism. IEEE Internet Computing, Jan./Feb. 2004, pp. 96, 93-95

28. Andrew P. Black, Vincent Cremet, Rachid Guerraoui and Martin Odersky, An Equational Theory for Transactions, 23rd Conference on Foundations of Software Technology and Theoretical Computer Science, Mumbai (Bombay), India, December 2003.

29. Andrew Black, Nathanael Schärli and Stéphane Ducasse. Applying Traits to the Smalltalk Collection Hierarchy. ACM Conference on Object Oriented Systems, Languages and Applications (OOPSLA '03), pp. 47–64, October 2003

30. Nathanael Schärli, Stéphane Ducasse, Oscar Nierstrasz and Andrew Black. Traits: Composeable Units of Behavior. European Conference on Object-Oriented Programming (ECOOP), July 2003. Springer LNCS 2743, Ed. Luca Cardelli.

31. Rainer Koster, Andrew P. Black, Jie Huang, Jonathan Walpole and Calton Pu. Thread Transparency in Information Flow Middleware. Software—Practice & Experience, **33**(*4*) pp. 321–349.

32. A. P. Black, J. Huang, R. Koster, J. Walpole, and C. Pu. Infopipes: an Abstraction for Multimedia Streaming, *Multimedia Systems Journal* (Special issue on Multimedia Middle-ware), **8**(*5*), Dec. 2002.

33. Oscar Nierstrasz, Gabriela Arévalo, Stéphane Ducasse, Roel Wuyts, Andrew Black, Peter Müller, Christian Zeidler, Thomas Genssler and Reinier van den Born. A Component Model for Field Devices. IFIP/ACM Conference on Component Deployment, Berlin, Germany, June 2002.

34. Johan Nordlander, Mark P. Jones, Magnus Carlsson, Richard B. Kieburtz and Andrew Black, Reactive Objects. 5th IEEE International Symposium on Object-oriented Real-time distributed computing, Crystal City, Virginia, USA, April 2002.

35. Rainer Koster, Andrew P. Black, Jie Huang, Jonathan Walpole, and Calton Pu. Thread Transparency in Information Flow Middleware. Middleware 2001—IFIP/ACM International Conference on Distributed Systems Platforms, Heidelberg, Germany, November 2001. LNCS 2218.

36. Black, A. P. (1998). Object-oriented Programming: Regaining the Excitement. Proceedings of ECOOP'99, Springer Verlag LNCS **1628**, pp 519-528

37. Black, A.P. (1996) Object-oriented Languages: The Next Generation. *ACM Computing Surveys* **28**(4es) December 1996, Article 149 (Article in Electronic Section, *http://* [*www.acm.org/pubs/cita-*](http://www.acm.org/pubs/citations/journals/surveys/1996-28-4es/a149-black/) [*tions/journals/surveys/1996-28-4es/a149-black/*](http://www.acm.org/pubs/citations/journals/surveys/1996-28-4es/a149-black/))

38. M. Mira da Silva, M. P. Atkinson and A. P. Black. Semantics for Parameter Passing in a Type-complete Persistent RPC. Proceeding of the 16th Int. Conf. on Distributed Computing Systems, IEEE 1996, pp 411-419.

39. Calton Pu, Tito Autrey, Andrew Black, Charles Consel, Crispin Cowan, Jon Inouye, Lakshmi Kethana, Jonathan Walpole and Ke Zhang. Optimistic Incremental Specialization: Streamlining a Commercial Operating System. Proceedings of 15th ACM Symposium on Operating System Principles, December 1995, pp. 314–324.

40. A. P. Black and M.P. Immel. Encapsulating Plurality. Proceedings of European Conference on Object-Oriented Programming (ECOOP'93), July 1993. Springer LNCS Nr 707.

41. 20. R. K. Raj, E. D. Tempero, H. M. Levy, A. P. Black, N. C. Hutchinson, and E. Jul. Emerald: A General Purpose Programming Language. *Software—Practice & Experience*, **21**(*1*), Jan. 1991, pp. 91–118.

42. Andrew P. Black, and Yeshauahu Artsy. Implementing Location Independent Invocation. *IEEE Trans on Parallel and Distributed Systems*, **1**(*1*), Jan. 1990, pp. 107-119.

43. Andrew P. Black, and Yeshauahu Artsy. Implementing Location Independent Invocation. Proc. 9th International Conference on Distributed Computing Systems. IEEE Press, June 1989, pp. 550-559.

44. D. Notkin, A. P. Black, E. D. Lazowska, H. M. Levy, J. Sanislo, and J. Zahorjan, Interconnecting Heterogeneous Computer Systems, *Communications of the ACM*, **31**(3), pp. 259-273, 1988.

45. Andrew P. Black and Charles H. Burris, Jr. A compact representation for file versions: a preliminary report. Proc. 5th International Conference on Data Engineering. IEEE Press, February 1989.

46. E. Jul, H. Levy, N. Hutchinson and A. P. Black. Fine-Grained Mobility in the Emerald System, *ACM Trans. Computer Syst.*, **6**(1), February 1988, pp. 109-133.

47. E. Jul, H. Levy, N. Hutchinson and A. P. Black. Fine Grained Mobility in the Emerald System. Proc. 11th ACM Symposium on Operating Systems Principles, Austin, TX, November 1987.

48. J. H. Maloney and A. P. Black. File Sessions: A Technique for Analyzing Dynamic File Usage Patterns. Proc. 3rd International Conference on Data Engineering, Los Angeles, CA. February 1987.

49. A. P. Black, N. Hutchinson, E. Jul, H. M. Levy, and L. Carter. Distribution and Abstract Types in Emerald. *IEEE Transactions on Software Engineering*, **13**(*1*), pp 65–76, January 1987.

50. Andrew P. Black, Norman Hutchinson, Eric Jul, Henry M. Levy. Object Structure in the Emerald System. Procs. 1st ACM Conference on Object-oriented Programming Systems, Languages and Applications (OOPSLA '86), October 1986, pp. 78–86.

51. Andrew P. Black. Supporting Distributed Applications: Experience with Eden. Proc. 10th ACM Symposium on Operating Systems Principles. December 1985, pp 181–193.

52. Guy Almes, Andrew P. Black, Edward Lazowska and Jerre Noe. The Eden Project: A Technical Review. *IEEE Trans*. *Softw. Eng*. Vol SE-11 Nr 1. January 1985, pp 43–59.

53. Guy Almes, Andrew P. Black, Carl Bunje and Doug Wiebe. Edmas: The Eden Demonstration Mail System. Proc. 7th International Conference on Software Engineering, March 1984, pp 56–66.

54. Andrew P. Black. Asymmetric Stream Communication. Proc. 9th ACM Symposium on Operating Systems Principles, October 1983, pp 4–10.

Loosely refereed papers (those reviewed by workshop committees, and invited papers at conferences)

55. AP Black, KB Bruce. Teaching programming with Grace at Portland State. Journal of Computing Sciences in Colleges **34** (*1*), pp. 223–230. 2018

56. AP Black, KB Bruce Experience report: Early experience with Grace. Journal of Computing Sciences in Colleges **33** (*4*), pp 150–156

57. KB Bruce and AP Black. Teaching with Grace. "Short" paper, SNAPL 2015—Summit On Advances In Programming Languages, Asilomar (2015)

58. AP Black. The Expression Problem, Gracefully. Proceedings of the workshop on MechAnisms for SPEcialization, Generalization and inHerItance (2015)

59. AP Black. What shall we tell the children (about inheritance)? Proceedings of the 5th Workshop on MechAnisms for SPEcialization. (2013)

60. M Homer, KB Bruce, J Noble, and AP Black. Modules as gradually-typed objects. Proc. 7th Workshop on Dynamic Languages and Applications (DYLA '13) at ECOOP. Article 1. (2013)

61. J Noble, M Homer, KB Bruce, and AP Black. Designing Grace: Can an introductory programming language support the teaching of software engineering? IEEE 26th Conf. Software Engineering Education and Training (CSEE&T), pp 219–228, (2013)

62. Noble, J., Bruce, K. B., Black, A. P., and Homer, M. 2012. Grace: an open-source, object-oriented programming language for education. GOTO Magazine 2, 1, 30–33.

63. Michael Homer, James Noble, Kim B. Bruce, Andrew P. Black and David J. Pearce: Patterns as objects in Grace. Dynamic Languages Symp. 2012: pp. 17–28 (43% acceptance rate)

64. M Orhai and AP Black. Approximate parallel sorting on a spatial computer. *Proc*. *2012 ACM workshop on Relaxing synchronization for multicore and manycore scalability*. pp 61–66. (2012)

65. Andrew P. Black, Kim B. Bruce and James Noble. Designing the next educational programming language. SPLASH/OOPSLA Companion 2010, pp 201–204.

66. Emerson Murphy-Hill and Andrew P. Black. *Seven Habits of a Highly Effective Smell Detector*. Proceedings of the 2008 international Workshop on Recommendation Systems for Software Engineering, Atlanta, Georgia, November 2008.

67. Emerson Murphy-Hill, Andrew Black, Danny Dig, and Chris Parnin. Gathering Refactoring Data: a Comparison of Four Methods. 2nd Workshop on Refactoring Tools at OOPSLA 2008. ACM, 2008.

68. Emerson Murphy-Hill and Andrew P. Black. High Velocity Refactorings in Eclipse. In L.-T. Cheng, A. Orso, and M. P. Robillard, editors, Eclipse Technology eXchange (ETX 2007), pages 1–5. ACM, 2007.

69. Emerson Murphy-Hill and Andrew P. Black. *Why Don't People Use Refactoring Tools?* ECOOP 2007 Workshop on Refactoring, Berlin, July 2007.

70. Emerson Murphy-Hill and Andrew P. Black. Tools for a successful refactoring. DEMONSTRATION SESSION. Companion to the 21st ACM SIGPLAN conference on Object-oriented programming systems, languages, and applications. pp. 694–695, October 2006.

71. Daniel Vainsencher and Andrew P. Black. An Architecture for Extensible Code Models. Pattern Languages of Programming, October 2006. (http://hillside.net/plop/2006/accepted_papers.htm)

72. Philip J. Quitslund, Emerson R. Murphy-Hill, and Andrew P. Black. *Supporting Java traits in Eclipse*. Proceedings of the 2004 OOPSLA workshop on Eclipse Technology eXchange,Vancouver, British Columbia, pp. 37–41, October 2004.

73. Philip J. Quitslund and Andrew P. Black. *Java with Traits—Improving Opportunities for Reuse*. Proceedings of the MASPEGHI Workshop at ECOOP 2004 (MechAnisms for SPEcialization, Generalization and inHerItance).

74. Andrew P. Black and Mark P. Jones. *The Case for Multiple Views*. Proceedings of the ICSE Workshop on Directions in Software Engineering Environments, Edinburgh, Scotland, May 2004.

75. Andrew P. Black. *A Use for Inheritance*. In Proceedings of the Inheritance Workshop at ECOOP 2002, Málaga, Spain: Information Technology Research Institute, University of Jyväskylä, Finland

76. Rainer Koster, Andrew P. Black, Jie Huang, Jonathan Walpole, and Calton Pu. *Infopipes for Composing Distributed Information Flows*. International Workshop on Multimedia Middleware, October 2001.

77. Andrew P. Black, Jie Huang and Jonathan Walpole. *Reifying Communication at the Application Level*. International Workshop on Multimedia Middleware, Ottawa, October 2001.

78. Huang, J., Black, A.P., Walpole, J. and Pu, C. *InfoPipes—an Abstraction for Information Flow*. ECOOP'2001 Workshop on the Next 700 Distributed Object Systems, Budapest, Hungary, June 2001.

79. Andrew P. Black and Jonathan Walpole. *Aspects of Information Flow*. ECOOP'2000 Workshop on Aspect-Oriented Programming, June 2000.

80. Calton Pu, Andrew Black, Crispin Cowan, Jonathan Walpole and Charles Consel. *Microlanguages for Operating System Specialization*. DSL '97—First ACM SIGPLAN Workshop on Domain-Specific Languages, Paris, France. January 1997, pp. 49–57.

81. A. P. Black and J. Inouye. *System Support for Mobility*. Seventh ACM SIGOPS European Workshop: Systems Support for Worldwide Applications, Connemara, Ireland, September 1996 ACM SIGOPS, pp 129–132.

82. Andrew P. Black and Mark P. Jones. *Perspectives On Software*. OOPSLA 2000 Workshop on Advanced Separation of Concerns in Object-oriented Systems.

83. Andrew P. Black. *Doing the Requirements Work*. International Workshop on Software Engineering Education, Boston, Massachusetts. May 1997.

84. A. P. Black and J. Walpole, *Objects to the rescue! or httpd: the next generation operating system*, 6th ACM SIGOPS European Workshop, Wadern, Germany, 1994. Also published in ACM Operating Systems Review **29**(1), Jan. 1995, pp 91-95.

85. A. P. Black and J. Palsberg. *Foundations of Object-Oriented Languages*. SIGPLAN **29**(*3*) 1994, pp.3-12.

86. Andrew P. Black. *Object Identity*: Proceedings of the IEEE International Workshop on Object-Orientation in Operating Systems (IWOOOS), December 1993.

87. Andrew P. Black. *Objects are Enough*. Presented at ECOOP'93 workshop on Object-based Distributed Programming, July 1993.

88. Andrew P. Black. *Dismissing the "Final Concern", or Matches Rides Again*. Presented at ANSA workshop on F-bounded quantification, Cambridge, UK, 1992.

89. Andrew P. Black, *Multiple Inheritance and Type System Design*, ECOOP'92 Workshop on Multiple Inheritance and Multiple Subtyping, Utrecht, The Netherlands. Working Paper WP-23, Univ. of Jyväskylä, Dept. of Comp. Sci and Inf. Sys. 1992, pp 35–38.

90. Andrew Black, *Types and Polymorphism in Emerald*, ECOOP'91 Workshop on Types, Inheritance and Assignment, Geneva, Switzerland. PB-357, University of Aarhus, 1991.

91. Andrew P. Black. *Understanding Transactions in the Operating System Context*. Fourth ACM SIGOPS European Workshop. Operating Systems Review **25**(1), Jan. 1991, pp 73-76.

92. Andrew P. Black. *The Workstation as Terminal*. Workshop on Workstation Operating Systems, IEEE TCOS, Cambridge, MA, Nov. 1987.

93. 54. Andrew P. Black. *The Eden Project: Overview and Experiences*. Invited paper, 1986 European Unix Users Group Conference on Distributed Systems, Manchester, England, September 1986, pp 177–189.

94. Andrew P. Black and Edward D. Lazowska. *Interconnecting Heterogeneous Computer Systems*. Invited paper, 1986 European Unix Users Group Conference on Distributed Systems, Manchester, England, September 1986, pp 43–52.

95. A. P. Black and V.J. Rayward-Smith. *Proposals for Algol H — a Superlanguage of Algol 68*. Algol Bulletin Nr 42, May 1978, pp 36–49.

Technical Reports and Unrefereed Papers (excluding those later published more formally above)

96. Nathanael Schärli, Oscar Nierstrasz, Stéphane Ducasse, Roel Wuyts and Andrew Black. Traits: The Formal Model. OGI School of Science & Engineering, Oregon Health & Science University, Technical Report CSE 02-013. November 2002. Revised February 2003.

97. Andrew P. Black, Magnus Carlsson, Mark P. Jones, Richard Kieburtz and Johan Nordlander. *Timber: A Programming Language for Real-Time Embedded Systems*. OGI School of Science & Engineering, Oregon Health and Sciences University, Technical Report CSE 02-002. April 2002.

98. S. M. Beattie, A. P. Black, C. Cowan, C. Pu, and L. P. Yang, *GuardHouse: Locking the Stable door ahead of the Trojan Horse*, Oregon Graduate Institute, Beaverton, Technical Report CSE-00-006, May 1999.

99. Andrew P. Black and Norman Hutchinson. *Typechecking Polymorphism in Emerald*. Technical Report CRL 91/1, Digital Equipment Corporation, Cambridge Research Laboratory, Jan. 1991.

100. N. C. Hutchinson, R. K. Raj, A. P. Black, H. M. Levy, and E. Jul, *The Emerald Programming Language Report*, Technical Report 87-10-07, University of Washington, Department of Computer Science, October 1987.

101. Andrew P. Black, Edward Lazowska, Jerre Noe and Jan Sanislo. *The Eden Project: A Final Report*. Technical Report 86-11-01, University of Washington, Department of Computer Science, Nov. 1986.

102. L. S. Nielsen and A. P. Black. *Proving Monitor Proof Rules*. Technical Report 85-08-01, University of Washington, Department of Computer Science, August 1986.

103. Andrew P. Black. *The Eden Programming Language*. Technical Report 85-09-01, University of Washington, Department of Computer Science, December 1985.

104. A. P. Black, N. Hutchinson, E. Jul and H. Levy. *Distribution and Abstract Types in Emerald*. Technical Report 85-08-05, University of Washington, Department of Computer Science, August 1985.

105. A. P. Black, J. P. Brower, and R. Korry, *The Abstract Type STREAM in Eden*, University of Washington, Department of Computer Science, Seattle, WA. Eden Project Document, July 1984.

106. J. M. Adams and A. P. Black, "Letter to the Editor," Operating Systems Review, **17**(1), January 1983, pp. 6-8.

107. T. Knight and A. Black, *Using the DEVMETH Tools in Implementing Eden*, University of Washington, Department of Computer Science, Seattle, WA. Eden Project Document, October 1982.

108. J.M. Adams, A.P. Black. *On Proof Rules for Monitors*. Operating Systems Review, **16**(2) April 1982, pp 18–27.

109. Andrew P. Black. *Exception Handling: The Case Against*. Technical Report 82-01-02, University of Washington, Department of Computer Science, January 1982.

110. Andrew P. Black. *Report on the Programming Notation 3R*. Technical Monograph PRG-17, Oxford University Computing Laboratory, August 1980.

111. Andrew P. Black. *Exception Handling and Data Abstraction*. Research Report RC 8059, IBM T.J. Watson Research Center, Yorktown Heights, NY, January 1980.

Books, Book Chapters, and Dissertations

112. J Brant, J Lecerf, T Goubier, S Ducasse, AP Black. Smacc: a Compiler-Compiler. Pharo, 2018, The Pharo Booklet Collection. hal-01612820v2

113. Andrew P. Black, Laurence Tratt: DLS'14, Proceedings of the 10th ACM Symposium on Dynamic Languages, ACM 2014, ISBN 978-1-4503-3211-8

114. Andrew P. Black, Jan S. Rellermeyer, Tim Verbelen: Proceedings of the 2014 Workshop on Eclipse Technology eXchange, ETX 2014, ACM 2014, ISBN 978-1-4503-2530-1

115. Andrew P. Black, Todd D. Millstein: Proceedings of the 2014 ACM International Conference on Object Oriented Programming Systems Languages & Applications, OOPSLA 2014, October 20-24, 2014. ACM 2014, ISBN 978-1-4503-2585-1

116. Andrew P. Black: Conference on Systems, Programming, and Applications: Software for Humanity, SPLASH '14 — Companion Volume. ACM 2014, ISBN 978-1-4503-3208-8

117. Andrew P. Black, Shriram Krishnamurthi, Bernd Bruegge, Joseph N. Ruskiewicz: Onward! 2014, Proceedings of the 2014 ACM International Symposium on New Ideas, New Paradigms, and Reflections on Programming & Software, ACM 2014, ISBN 978-1-4503-3210-1

118. A. P. Black, S. Ducasse, O. Nierstrasz, D. Pollet, D. Cassou, and M. Denker. *Pharo by Example*. Square Bracket Associates, 2009. http://PharoByExample.org/

119. A. P. Black, S. Ducasse, O. Nierstrasz, D. Pollet, D. Cassou, and M. Denker. *Squeak by Example*. Square Bracket Associates, 2007. http://SqueakByExample.org/

120. A. P. Black, editor. ECOOP 2005 — Object-Oriented Programming, 19th European Conference, Glasgow, UK, July 25-29, 2005, Proceedings, volume 3586 of Lecture Notes in Computer Science. Springer, 2005.

121. Ph. Lahire, G. Arévalo, H. Astudillo, A.P. Black, E. Ernst, M. Huchard, T. Oplustil, M. Sakkinen, P. Valtchev. MASPEGHI 2004—MechAnisms for SPEcialization, Generalization and inHerItance. In ECOOP 2004 Workshop Reader, Springer LNCS 3344, pp. 101–117

122. G. Arévalo, A. P. Black, Y. Crespo, M. Dao, E. Ernst, P. Grogono, M. Huchard, and M. Sakkinen. The Inheritance workshop. In J. H. Núñez and A. M. D. Moreira, editors, *ECOOP Workshops*, volume 2548 of Lecture Notes in Computer Science, pages 117–134. Springer, 2002.

123. A. P. Black, E. Ernst, P. Grogono, and M. Sakkinen, editors. *Proceedings of the Inheritance Workshop at ECOOP 2002*. Information Technology Research Institute, University of Jyväskylä, 2002.

124. Andrew P. Black. *Exception Handling: The Case Against*. D. Phil Thesis, University of Oxford, January 1982. pp 238.

Research Grants

PSU *Faculty Enhancement Grant*. July 2015. $15,000.

PSU Faculty Development Committee. Travel Grant. June 2014. $3875

IBM Open Collaborative Research Award. December 2011. $75,000.

PSU *Faculty Enhancement Gran*t for work on the development of the Grace programming language. June 2011. $3578

PSU Faculty Development Committee. Travel Grant. June 2010. $938

IBM Open Collaborative Research Award. June 2010. $75,000.

PSU Faculty Development Committee. Travel Grant. February 2009. $1000.

PI, IBM Eclipse Innovations Award. *Supporting Java Traits in Eclipse*, with Philip Quitslund.

$25 000. February 2004. PI, NSF Award CCR-0313401. *ITR: Multiple-view Programming*, with Mark Jones. $460 000. Sep. 2003–Aug. 2006.

PI, NSF Award CCR-0219686. *ITR: A Domain-Specific Language for Infopipes*, with Jonathan Walpole. $379 697. Sept. 2002 – Aug. 2005.

Co-PI, Oregon University System (OUS ETIC award): *Putting 'Perspectives on Software' into Practice*, with Mark Jones. $50,000. Jan. 2002– June 2003.

Co-PI, Object Technology International: *Multiple Views on Software in the Eclipse Platform*, with Mark Jones. $50 000, Jan. 2002 – Dec. 2003.

Co-PI, NSF Award CCR-0098323: *Perspectives on Software*, with Mark Jones. $229 925, June 2001– May 2003, plus $6 000 Research Experience for Undergraduates supplement plus $9 926 travel supplement for sabbatical support.

Investigator, DARPA contract: *Temporally-Aware Reactive Programs*. $3M (including options) July 2000 – August 2004, with M. Jones (PI), R. Kieburtz and J. Walpole.

Proposer, J.M. Murdock Charitable Trust: *Research Program Expansion*. $272 800, 2000–2003. Institutional matching funds for NSF Research Infrastructure Award below.

"Key Staff", J.M. Murdock Charitable Trust: *Technology for Education at OGI*, with Prof Dan Hammerstrom, Head of ECE. $1M for institution-wide educational infrastructure, 1998-99.

Principal Investigator, NSF Research Infrastructure Award CDA-9703218: *A Wide-Spectrum Infrastructure for Software Research*. $1 201 310 + $515 897 OGI contribution + $200 000 industrial contribution. July 1997– June 2002. Department-wide infrastructure grant on which I took the lead.

Investigator, DARPA contract: *Applying Specialization to Improve Survivability of OS kernels*, $1 198 000, with Pu (PI) Consel, Cowan, Walpole, McHugh and Schubert. 1996–1999.

Investigator, ARPA contract on *Microlanguage-Based Specialization*, $875 000, with Consel and Walpole. Pu was the PI. 1995–1998.

Investigator, DARPA grant on *Heterodyne*: A Regenerative Receiver for Dynamic Specialization Technology. Maier was the PI. 1996–1999.

Co-principal Investigator, NSF Award: *Incorporating Research into the Undergraduate Curriculum*. Co-PI: Judy Cushing, the Evergreen State University. 1994-1997.

Co-principal Investigator, NERO Grant *A Network Based Course in Object-Oriented Programming*. $20 000. September 1994 – June 1995.

Co-principal Investigator, NSF Grant Nr MCS-8004111, *A Functionally Integrated Environment for Distributed Computing* (Coordinated Experimental Research Program). $4 202 271. September 1980 – February 1986.

Co-principal Investigator, NSF Grant Nr DCR-8420945, *Integration in Homogeneous and Heterogeneous Distributed Computer Systems* (Coordinated Experimental Research Program). $1 151 085 (includes $230 217 University contribution). September 1985 – February 1988.

Co-principal Investigator, NSF Grant Nr CCR-8700106, *Emerald: A Language for Distributed Programming,* $120 285. November 1987 – November 1989.

Co-principal Investigator, Xerox Corporation University Grants Program, $761 200 (equipment only). September 1985 – September 1987.

Co-principal Investigator, Digital Equipment Corporation External Research Program, *Programming for Distribution*, $193 590 (equipment only). December 1985.

Co-principal Investigator, Digital Equipment Corporation External Research Program, *Interconnecting Heterogeneous Computer Systems*, $300 000 (equipment only).

Software Systems

Since summer 2014, I have been the principle maintainer of the open source *minigrace* compiler for the Grace programming language (github.com/minigrace). I have supported my own use of *minigrace* in teaching two (soon to be three) classes, as well of that of colleagues at Pomona College. Originally written by a student at VU Wellington, over the course of more than 950 commits I have added or changed more than 150k lines of code, out of a total of ~350k lines. Using *minigrace,* Grace programs can be run on the web (http://web.cecs.pdx.edu/~grace/minigrace/exp/).

Professional Activities

Organizer of IFIP WG 2.16 meetings at Skamania (2014) and Portland (2019)

Program Committee Member, Fourth ACM Conference on History of Programming Languages, 2018–present

Secretary, SIGPLAN Executive Committee, 2009–2015.

Chair, MASPEGHI 2015, Prague.

Member, IFIP WG 2.1 Algorithmic Languages and Calculi, December 2014–

General Chair of SPLASH 2014, a large SIGPLAN Multi-conference that includes OOPSLA, Onward!, DLS, and a host of smaller workshops, tutorials, and panels.

Member SPLASH Steering committee, 2014–2018

Member, Onward! Steering Committee, 2014–2018

Program Committee Member, MASPEGHI 2013

Co-Organizer, RACES Workshop at SPLASH 2012.

Co-Organizer, LADA workshop at POPL 2012.

Program Committee Member, IWST 2012

Co-chair, Smalltalk Directions 2012.

Invited address at Scientific opening of the Ole-Johan Dahl Building, University of Oslo, August 2012.

Organizing committee for ACM *Turing 100* event to celebrate A. M. Turing's 100th Birthday. 2010-2012

Program Committee Member, DLS 2011

Co-founder and member, Working Group on Language Design (Since June 2011: IFIP WG 2.16)

Programme committee, Workshop on Refactoring Tools 2008, 2009

Programme committee, PLATEAU Workshop (Evaluation and Usability of Programming Languages and Tools) 2009, 2010, 2013, 2014.

Essays Committee Chair, OOPSLA 2008.

Program Committee Member, AOSD 2007.

Program Committee Member, OOPSLA 2005, 2008

Program Committee Member, 3rd History of Programming Languages Conference, 2005–2007

Member AiTO General Assembly. (AiTO is the organization that stands behind the annual ECOOP conference.)

Member, Squeak Foundation Board, 2007–8

Program Committee Chair, ECOOP 2005.

Program Committee Member, FOOL 2005

Co-Organizer of the MASPEGHI Workshops at ECOOP 2004 and ECOOP 2010

Program Committee Member, ECOOP 2003.

Co-Organizer of the Inheritance Workshop at ECOOP 2002.

Keynote speaker at Foundations of Object-Oriented Languages (FOOL) 2002

Co-organizer of workshop on Next 700 Distributed Object Systems at ECOOP 2001

Speaker and participant at the Portland Extreme Programming Users Group (http://xpdx.org)

Banquet Speaker, ECOOP 1998, Brussels, Belgium.

General Chair, IEEE International Workshop on Object-Orientation in Operating Systems (IWOOOS'96) Seattle, November 1996.

Visiting Professor, University of Glasgow. Non-renewable five-year appointment Sept. 1994–Aug. 1999.

Editorial Board, Journal of Programming Languages.

Invited participant, ACM Workshop on Strategic Directions in Computing Research, June 1996, and member of working group on Object-Oriented Programming.

General Chair, 14th ACM SIGOPS Symposium on Operating Systems Principles, Dec. 1993.

Member of Program Committees: 7th ACM SIGOPS European Workshop, September (1996), 15th Symposium on Operating System Principles (1995), 5th ACM SIGOPS European Workshop on Models and Paradigms for Distributed Systems Structuring (1992), 12th Symposium on Operating System Principles (1989), ACM SIGPLAN'91 Conference on the Design and Implementation of Programming Languages.

Invited Speaker at Conferences: Workshop on Exception Handling at ECOOP 2005. National Educational Computing Conference (1997). Invited member of panels: NSF-DARPA Workshop on Future Directions in Hybrid and Embedded Systems (2000), 9th ICDCS, 1989; ECOOP'93 workshop on Object-based Distributed Programming, 5th SIGOPS European Workshop (1992), 15th SOSP (1995).

Organizer and session chairman at ACM SIGOPS Workshop on Accommodating Heterogeneity, December 1985.

Referee for Acta Informatica, ACM Trans. Prog. Lang. Systems, IEEE Trans Softw. Eng., Computer Journal, Computer Languages, Addison-Wesley Publishers, Benjamin/Cummings Publishers, MIT Press, DC Heath Publishers, Conference on Functional Languages and Computer Architecture, Computing Surveys, SOSP, Information Processing Letters, Software—Practice and Experience, Computer Bulletin, National Science Foundation, IEEE Software, IEEE Distributed Computing Systems Conference, Int'l J. of Parallel Processing, ACM Trans. on Computer Systems, J. Systems & Software.

Invited technical presentations at Cornell University (1981), University of British Columbia (1981), University of Victoria (1983), IBM Yorktown Heights (1981, 1986), Xerox PARC (1986), IBM San Jose(1986), Yale (1981), New Mexico State University (1979 & 1981), Boeing AI Center (1984), NSF CER Meetings (1982-85), Digital SRC (1986), Digital Networks and Communications (1986), Tektronix Research Laboratory (1986), AT&T Bell Laboratories, Murray Hill (1986), IEEE Workshop on Design Principles for Experimental Distributed Systems (1986), IBM ACIS Study Conference (1986), University of Arizona (1989), Olivetti Research Laboratory (1989), University of Oxford Programming Research Group(1990), University of Glasgow (1990, 1996, 1997), University of Lancaster(1990), Harvard University(1992), Dartmouth College(1992), University of Massachusetts at Amherst (1992), Brown University (1992), Boston University (1993), OGI (1994), Cambridge University (1997, 2000), The Evergreen State College (1996, 1997, 1998), Microsoft Cambridge Research Laboratory (2000), Swiss Federal Institute of Technology—Lausanne (EPFL) (2000 and 2001), Purdue University (2002), University of Oregon (2007), University of Toronto (2007). More recent presentations are not listed here, but are ongoing.

PSU Service

Member, PSU Faculty Development Committee, 2014–2016

Member, PSU-AAUP Grievance Committee, 2008–2010

CS Department Undergraduate Curriculum Revision Committee, 2009–10

President's Advisory Committee on OUS–PSU structure, 2009–2010

Member of Faculty Senate, 2005-2008

CS Department Undergraduate Committee 2004–05

CS Department Graduate Committee, 2005–2008

CS Department Colloquium Chair 2004–2005, 2007–2008

Speaker and facilitator at PSU Faculty Symposium on Copyright, April 2008

Member of ad-hoc committee on Scholarly Communication, 2005–2008

OGI Service

Department Head, Computer Science & Engineering, 1994-1999.

Member, Academic Renewal Committee (ARC), 1995-1996

Chair, ARC sub-committees on Administrative Systems Re-engineering

Chair, ARC sub-committee on Electrical and Computer Engineering

Member, administrative re-engineering task force, 1996

Member, CSLU Task force, 1997-8

Member, Presidential Search Committee, 1997-8

Professional Organizations

Past member, British Computer Society.

Member, Association for Computing Machinery (ACM), and member of ACM special interest groups on Programming Languages (SIGPLAN), Software Engineering (SIGSOFT) and Operating Systems (SIGOPS).

Member, Union of Concerned Scientists.

Member, Computer Professionals for Social Responsibility.

Consulting

Consultant to Microsoft Corporation on the language and type system that eventually became .NET and the CLR.

Technical Expert for Wilson Sonsini Goodrich & Rosati in a patent infringement lawsuit involving the foundations of object-oriented programming.

Technical Expert for Finnegan, Henderson, Farabow, Garrett and Dunner, and later Quinn Emanuel, in patent infringement and international trade lawsuits involving software frameworks for mobile devices.

Teaching

At the University of Washington, I taught the undergraduate introductory programming course, and graduate courses in Formal Semantics, Computer Reliability and Nuclear War, A Rigorous Approach to Programming, and Concepts of Programming Languages.

In 1986 I taught a course on Object-oriented programming to professional engineers at an instrument manufacturing company. I presented a tutorial on types at the 1992 OOPSLA conference, and a tutorial on Squeak Smalltalk at ECOOP 2001 and 2002.

In 1991–92 I taught the graduate Operating Systems course at Harvard University. At Harvard I also helped to lead a graduate reading group on the subject of types and object-oriented programming languages.

In Spring 1995, I developed and taught a new graduate course in Object-Oriented Programming at OGI that combined traditional OOP using Smalltalk with recent research in Distributed Object-Oriented and Typed Object-Oriented Programming.

My teaching history at Portland State is summarized in the table below. Overall, I am proud of my teaching, and see this as an important part of my job. Within limits, I also welcome the opportunity to broaden my teaching portfolio. I've taught CS 311 (Theory) and CS 350 (Algorithms), which are important foundational courses for our majors, even though neither is close to my research interests. I also continue to teach CS 305 (Ethics), which provides a useful opportunity to hep our students develop a "voice", as well as to coach them on writing and presentation skills. CS 669 is an important service course for our PhD students; it can be challenging because many students don't believe that they need to take it, but it can also be gratifying when students tell me afterwards "This is the most useful class that I have ever taken in the US." The courses that most closely align with my current research interests in programming and the teaching of programming are CS161, CS199, CS320, and CS420/520.

Courses Taught at PSU

Date	Course	Co-taught with:	Enroll-ment
Spring 2020	CS 320 Principles of Programming Languages		86
Winter 2020	CS 699 Scholarship Skills		5
Spring 2019	CS 420/520 Object-oriented Programming		
Winter 2019	CS 305 Ethical, Social and Legal Implications …		23
	CS 350 Algorithms & Complexity		33
Fall 2018	CS 350 Algorithms & Complexity		22
Spring 2018			

Winter 2018	Sabbatical		
Fall 2017			
Spring 2017	CS 161 Intro to Prog & Problem-Solving		37
Winter 2017	CS 669 Scholarship Skills		4
Fall 2016	CS 161 Intro to Prog & Problem-Solving		160
Spring 2016	CS 420/520 Object-oriented Programming		12
Winter 2016	CS 669 Scholarship Skills		11
	CS 305 Ethical, Social and Legal Implications …		7
Fall 2015	CS 350 Algorithms & Complexity		32
Summer 2015	CS 199 New Beginnings Practical		11
Spring 2015	CS 420/520 Object-Oriented Programming		22
Winter 2015	CS 669 Scholarship Skills	Maier	10
	CS 350 Algorithms & Complexity		59
Fall 2014	Teaching release to organize SPLASH		
Spring 2014	CS 305 Ethical, Social and Legal Implications …		26
Winter 2014	CS 350 Algorithms & Complexity		51
Fall 2013	CS 161 Intro to Prog & Problem-Solving	Delcambre	102
Spring 2013	CS 350 Algorithms & Complexity		29
Winter 2013	CS 569/669 Scholarship Skills		9
	CS 420/520 Object-Oriented Programming		10
Fall 2012	CS 305 Ethical, Social and Legal Implications …		16
Spring 2012	CS 305 Ethical, Social and Legal Implications …		30
Winter 2012	CS 569/669 Scholarship Skills		5
	CS 420/520 Object-Oriented Programming		20
Fall 2011	CS 350 Algorithms and Complexity		33
Spring 2011	Sabbatical		
Winter 2011			
Fall 2010	CS 569/669 Scholarship Skills		14
Spring 2010	CS 311 Computational Structures		44
Winter 2010	CS 569/669 Scholarship Skills		13
Fall 2009	CS420/520 Object-oriented Programing		29

Summer 2009	CS 199 Comp Science for Beginners		8
Spring 2009	CS 405 R&C: Design of Programs		2
Winter 2009	CS 410/510 Advanced Programming	Jones	25
Winter 2009	CS569/669 Scholarship Skills	Leen	18
Spring 2008	CS 311 Computational Structures		26
Winter 2008	CS 510 Scholarship Skills		9
Fall 2007	CS 311 Computational Structures		31
Spring 2007	CS 410/510 Advanced Programming	Sheard	20
Winter 2007	CS 420/520 Object-oriented Programming		5
Winter 2007	CS 510 Scholarship Skills	Leen	10
Summer 2006	CS 410/510 Extreme Prog Principles & Practice	Shore	12
Spring 2006	CS 410/510 Advanced Programming	Sheard	10
Winter 2006	CS 420/520 Object-oriented Programming		17
Spring 2005	CS 410/510 Distributed Computing		13
Fall 2004	CS 410/510 Object-oriented Programming		8

Student Supervision

CURRENT PH.D. STUDENTS

PRIOR PH.D. STUDENTS

Emerson Murphy-Hill, Programmer-Friendly Refactoring Tools, 2004–2009.

Chaun-kai Lin, DirectFlow: A Domain-Specific Language for Information-Flow Systems. 2004–2007.

Philip Quitslund, Traits in Java. 2004–2006.

Jie Huang, Infopipes: An Abstraction for Real-Rate Information Flow. 1999-2002.

Paul McKenney, Theoretical Foundations for Infopipes. 2001–2003.

Joshua Bower-Cooley, An Infopipe Infrastructure for CORIE. 2002–2003.

STUDENT INTERNS

Emerson Murphy-Hill, The Evergreen State University. (Summer 2003 and Summer 2004).

Philip Quitslund, Portland State University. (Winter/Spring 2003).

Stephen Drew, Undergraduate Intern from University of Waterloo. (Winter 2002).

D. Carlton (implementation of Gaggles and Forwarders, and merger of various strains of Emerald) 1993.

M. Immel (addition of distribution to the portable Emerald system) 1992.

PH.D. GRADUATES

Leif S. Nielsen, *Separation of Data Manipulation and Control: A Structuring tool for Concurrent Program Development*, (August 1986). University of Washington.

Norman C. Hutchinson, *Language Design for Distributed Applications*, (January 1987). University of Washington.

Emerson Murphy-Hill. *Programmer Friendly Refactoring Tools*, (March 2009). Portland State University

M.S. THESES

F. S. Hsu, *Re-implementing Remote Procedure Call*, (1985).
T. Yap, *Concurrent Euclid Message Module*, (1986)
C. Burris, *A Unified treatment of File Version Compaction*, (1987).
L. Vaitzblit, *A High-Bandwidth, Multimedia File Server*, (1991).

M.SC. PROJECTS
I. Domenech, *The Eden Command Language Interpreter*, (1984).
P. Jensen, *The Eden Command Language Virtual Machine*, (1984).
B. C. McCord, *Implementation of the Eden Programming Language*, (1984).

RESEARCH ASSISTANTS (NOT OTHERWISE INCLUDED ABOVE)
J. Brower (Eden input/Output Module and Eden debugger).
C. Binding (Window-oriented Terminal Handler).
P. Ma (Evaluation of Eden Checkpoint mechanism and construction of CE run-time kernel).

SENIOR YEAR (UNDERGRADUATE) PROJECTS
H. Matsuaka (Translator for the 3R programming language).
S. Evans (Debugging, extension and major performance enhancement of the Zed editor).

Patent

Co-inventor (with Y. Artsy) of US Patent Number 5,325,524 granted 28 June 1994: *Locating Mobile Objects in a Distributed Computer System*.