

EXHIBIT B-1

Resume

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Short Biography

Dr. Ellis Horowitz received his B.S. degree from Brooklyn College and his Ph.D. in computer science from the University of Wisconsin. He was on the faculty there and at Cornell University before assuming his present post as Professor of Computer Science and Electrical Engineering at the University of Southern California. He has also been a visiting Professor at M.I.T. and the Israel Institute of Technology (Technion).

Dr. Horowitz has held numerous academic administrative jobs including Associate Chairman of Computer Science at the University of Wisconsin. At U.S.C. he was chairman of the Computer Science Department from 1990 to 1999.

Dr. Horowitz is the author of ten books and over seventy journal articles and refereed conference proceedings on computer science subjects ranging from data structures, algorithms, and software design to computer science education. He has been a principal investigator on research contracts from NSF, AFOSR, ONR, and DARPA. He is a past associate editor for the journals Communications of the ACM and Transactions on Mathematical Software. He was an IBM Scholar from 1989-1993.

After completing his term as Computer Science dept. chairman, Dr. Horowitz was appointed Director of Information Technology and Distance Education in USC's School of Engineering. Part of his responsibilities included the Distance Education Network (DEN). As Director he oversaw an operation that offers more than 200 graduate engineering courses per year to more than 1,000 students. Courses are delivered across the United States by satellite broadcast and Internet webcast.

Dr. Horowitz is an active consultant to the legal community, specializing in intellectual property issues. He was the founder and CEO of Quality Software Products, a California Corporation, from 1983 - 1993. The company designed and developed UNIX application software.

Education:

Univ. of Wisconsin, Madison Ph.D. - 1/70, Computer Science

Univ. of Wisconsin, Madison M.S. - 1/67, Computer Science

Brooklyn College B.S. - 6/64, Mathematics

Employment History:

9/73 - Present Computer Science & Electrical Engin. Departments
University of Southern California

9/99 - 7/01 Director, Distance Education & Information Technology

6/91 - 9/99 Chairman

6/83 - Present Professor

8/75 - 6/83 Associate Professor

1/78 - 7/79, 9/90-6/91 Acting Chairman, Computer Science Department

9/73 - 8/75 Assistant Professor

2/80 - 7/80 Lady Davis Fellow and Visiting Associate Professor,
Department of Computer Science, *Technion*

9/79 - 1/80 Visiting Associate Professor, Department of Electrical
Engineering and Computer Science, *M.I.T.*

9/70 - 8/73 Assistant Professor, Computer Science Department
Cornell University.

9/69 - 6/70 Instructor and Assistant Chairman, Computer Sci. Dept.
University of Wisconsin

6/67 - 6/68 National Science Foundation Research Fellow

6/67 - 8/67 *I.B.M.* Corporation, Paris, France.

9/66 - 6/67 & Teaching Assistant, Computer Science Dept.,
University of Wisconsin

6/66 - 9/66 *I.B.M.* Corporation, Po'keepsie, N.Y. (Also 6/65-9/65)

Ph.D. Thesis: Advisor: George E. Collins

“Algorithms for Symbolic Integration of Rational Functions,”

Current Research Interests

- Software Engineering, methods for improving programming and programmer productivity. CASE environments
- Web architectures, web programming languages, search engines, peer-to-peer computing
- Intelligent Computer-Aided Instructional systems. Development of programming environments for ICAI.

Professional Activities:

1. ACM *National Lecturer*, January 1972 - June 1973. Lecturing on recent advances in arithmetic and algebraic algorithms.
2. SIGSAM: Vice-Chairman, 1973-75; Assistant Editor of SIGSAM Bulletin; Participant in SIGSAM Lectureship Program.
3. SIGCAS: Chairman, 9/75-9/77.
4. Referee and reviewer for *J. ACM*, *C. ACM*, *SIAM J. Comp.*, N.S.F. Office of Computer Activities, *J. Theoretical Comp. Sci.*, *IEEE Trans. on Computers*, *IEEE Trans. on Software Eng.*, *IEEE Computer*.
5. Reviewer for Addison Wesley, Harper & Row, and McGraw-Hill books on Computer and Information Science.
6. Editor, *Transactions on Mathematical Software* 1/76-1/79.
7. Editor, *Communications of the ACM*, 7/81 - 9/85.

Courses introduced at USC

1. *Data Structures: (CS 202 and CS 455a)* A basic undergraduate-graduate course consisting of ways to structure data for processing by computer including topics such as trees, binary trees, list processing, searching and sorting techniques.
2. *Analysis of Algorithms: (CS 570 and CS 303)* A one semester course presenting mostly recent results on the complexity of arithmetic and algebraic algorithms.
3. *Computerized Society: (CS 140)* An interdisciplinary course designed to study the political, economic, social and cultural impact of computers on society.
4. *Modern Techniques for the Design of Reliable Software:* A short course designed for industrial programmers and systems analysts. Topics include techniques for the design, coding, testing, and managing of software systems.
5. *Programming Languages: (CS571 and CS 420)* A comparative study of programming languages, emphasizing the evolution of imperative languages from FORTRAN to ALGOL60, PASCAL, SIMULA, EUCLID, CLU and ADA. More recently the course included PROLOG and ML. Even more recently JAVA, JAVASCRIPT, VBSCRIPT and PERL.
6. *Management of Computing Program:* Joint between the School of Business, Annenberg School of Communications and the Computer Science Department, its emphasis is to offer graduate level courses on the management of computer technology. Introduced two new courses: The Computer Software Products Industry and Managing a Computing Center. Both courses were taught, at the graduate level.
7. *Programming the World Wide Web: (CS351)* This course focuses on the phenomenon known as the World Wide Web (WWW or Web). Its main

objective is to present many of the technologies that the Web is based upon, including: HyperText Markup Language (HTML), HyperText Transfer Protocol (HTTP), programming languages for client-side applications, namely JavaScript and VBScript, and programming languages for server-side applications, namely Perl, Active Server Pages and Java Servlets.

PUBLICATIONS:

Journals:

1. "Fads Pass but Paradigms Remain," Short Note, *C.ACM*, vol. 14, no. 3, March 1971, p. 197. Reprinted in *C.ACM*, vol. 26, no. 1, Jan. 1983, pp. 106.
2. "Computers and Society: A Proposed Course for Computer Scientists," *C.ACM*, vol. 15, no. 4, April 1972, pp. 256-261 (with H. Morgan and A. Shaw).
3. "A fast Method for Interpolation Using Preconditioning," *Information Processing Letters*, vol. 1, no. 4, June 1972, pp. 157-163.
4. "The Efficient Calculation of Powers of Polynomials," *J. Computer and Systems Science*, vol. 7, no. 6, October 1973, pp. 469-481.
5. "Computers, Society and the Law," *C.ACM*, vol. 17, no. 11, November 1973, p. 715, also in *Jurimetrics Journal*, vol. 14, no. 3, Spring 1974, pp. 138-140.
6. "Computing Partitions with Applications to the Knapsack Problem" *J. ACM*, vol. 21, no. 2, April 1974, pp 277-292 (with S. Sahni).
7. "A Unified View of the Complexity of Evaluation and Interpolation," *Acta Informatica*, vol. 3, no. 2, 1974, pp. 123-133.
8. "The Minimum Root Separation of a Polynomial," *Math. Comp.*, vol. 28, no. 126, April 1974, pp. 589-597 (with G. Collins).
9. "On Computing the Determinant of Matrices with Polynomial Entries," *J. ACM*, vol. 22, no. 2, January 1975, pp. 38-50, (with S. Sahni).
10. "The Computation of Powers of Symbolic Polynomials," *SIAM J. Computing*, vol. 4, no. 2, June 1975, pp. 201-208 (with S. Sahni).
11. "A Sorting Algorithm for Polynomial Multiplication," *J.ACM*, vol 22, no. 4, October 1975 (also in *Proc. Math. Software II*, Purdue, May 1974), pp. 450-462.
12. "FORTRAN - Can it be Structured and Should it Be?" *Computer*, IEEE Computer Society, vol. 8, no. 6, June 1975, pp. 30-37.
13. "Exact and Approximate Algorithms for Scheduling Uniform Processors," *J.ACM*, vol. 23, no. 2, April 1976, pp. 317-327.
14. "The Training of Computer Scientists for Developing Nations," *C.ACM*, vol. 20, no. 12, December 1977, pp. 968-971.
15. "Abstract Data Types and Software Validation," *C.ACM*, vol. 21, no. 12,

- December 1978, pp. 1048-1063. (with J. Guttag, D. Musser)
16. "Combinatorial Problems: Reducibility and Approximation," *J. Ops. Res.*, vol. 26, no., 5, September 1978, pp. 718-759. (with S. Sahni).
 17. "A Linear Time Approximation Algorithm for Multiprocessor Scheduling," *BIT*, vol. 19, no. 3, 1979, pp. 312-320 (with G. Finn).
 18. "The Binary Tree as an Interconnection Network: Applications to Multiprocessor Systems and VLSI" *IEEE Trans. on Computers*, vol. C-30, no. 4, April, 1981
 19. "Divide-and-Conquer for Parallel Processing", *IEEE Trans. on Computers*, vol. C-32, number 6, June 1983, (with A. Zorat).
 20. "Concurrent Communication and Synchronization Mechanisms", *J. Software - Practice and Experience*, vol. 14 no.2, pp. 135-151, Feb. 1984. (with R. Williamson)
 21. "Algorithms for Trie Compaction" *ACM Trans. on Data Bases*, vol.9, no. 2 June, 1984, 243-263. (with M. Al-Suwaiyel)
 22. "An Expansive View of Reusable Software", *IEEE Trans. on Soft. Eng.* Vol. SE-10, No. 5, Sept. 1984, 477-487. reprinted in *Tutorial: Software Reusability*, edited by Peter Freeman, IEEE Computer Society Press, pp 39-49.
 23. "A Survey of Application Generators", *IEEE Software*, vol. 2 No. 1, Jan. 1985, 40-54 (with Kemper and Narasimhan), reprinted in *Selected Reprints in Software*, edited by M. Zelkowitz, IEEE Computer Society Press, Third Edition, 1987, 192-206.
 24. "SODOS: A Software Documentation Support Environment - Its Definition" *IEEE Trans. on Software Engineering*, vol. SE-12, no.8, Aug. 1986, (with R. Williamson)
 25. "SODOS: A Software Documentation Support Environment - Its Use" *IEEE Trans. on Software Engineering*, vol. SE-12, no. 11 Nov. 1986, (with R. Williamson) Reprinted in "Computer-Aided Software Engineering (CASE)," Edited by Elliot Chikofsky, *IEEE Computer Society*, Long Beach, Ca. 1988.
 26. "An Integrated System for the Creation of Educational Software", *Perspectives on Computing*, vol.8, no.1, Spring 1988, pp. 35-42.
 27. "A Formal Model for Software Project Management", *IEEE Trans. on Software Engineering*, vol. SE- no. 10, October 1989 pp. (with L. Liu)
 28. "A Guide to the Object-Oriented Database Landscape" *Object Oriented Databases and Applications to CASE, Networks, and VLSI CAD*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, with R. Gupta, pp. 1-12
 29. "An Overview of Existing Object-Oriented Database Systems" *Object Oriented Databases and Applications to CASE, Networks, and VLSI CAD*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, with R. Gupta, pp. 101-116.
 30. "The Development of a Framework for VLSI CAD" *Object Oriented*

- Databases and Applications to CASE, Networks, and VLSI CAD*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, with R. Gupta, pp. 237-260.
31. "Object Database Support for CASE" *Object Oriented Databases and Applications to CASE, Networks, and VLSI CAD*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, with Lung-Chun Liu, pp. 261-282.
 32. "Building your own software development environment", *Software Engineering Journal*, vol. 6, Number 5, September 1991, pp. 317-331 (with Y. Sugiyama)
 33. "Polygon Clipping: Analysis and Experiences" Jeffrey D. Ullman (Ed.): *Theoretical Studies in Computer Science*, 1992 (with M. Papa) 315-339
 33. "Experimental results from a prototype next generation process support system", *Review Technology*, vol. 2, number 1, Summer 1994 (with Boehm, Bose and Lee)
 34. "Cost Models for future life cycle processes: COCOMO2.0", *Annals of Software Engineering*, vol2, 1995 (with Boehm, Clark, Westland, Madachy and Selby)
 35. "WinWin: A system for Negotiating Requirements", *DACS Software Tech News*, vol. 3, number 1, 1999 (with Joo Lee and June Lee)

Books

1. *Practical Strategies for Developing Large Software Systems*, edited collection, Addison-Wesley Publishing Co., March 1975.
2. *Fundamentals of Data Structures*, Computer Science Press, division of W.H. Freeman, New York, August 1976 (with S. Sahni). Over 100,000 copies sold worldwide. Translated into Portuguese, Chinese.
3. *Fundamentals of Computer Algorithms*, Computer Science Press, division of W.H. Freeman, New York, September 1978 (with S. Sahni). Translated into German.
4. *Programming Languages: A Grand Tour*, edited collection, Computer Science Press, division of W.H. Freeman, New York, First Edition 1983, Second Edition 1986.
5. *Fundamental Concepts of Programming Languages*, Computer Science Press, division of W.H. Freeman, New York, 1983.
6. *Fundamentals of Data Structures in Pascal*, Computer Science Press, division of W.H. Freeman, New York, 1983.
7. *Fundamentals of Data Structures in Turbo Pascal*, Computer Science Press, division of W.H. Freeman, New York, 1988.
8. *Object Oriented Databases and Applications to CASE, Networks, and VLSI CAD*, Prentice-Hall, Englewood Cliffs, New Jersey, 1990, with R. Gupta.
9. *Fundamentals of Data Structures in C*, Computer Science Press, division of W.H. Freeman, New York, 1992.
10. *Fundamentals of Data Structures in C++*, Computer Science Press,