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Summary

Lecturer in computer science and engineering at University of Michigan. Previously, lecturer in electrical engineering at University of Washington Bothell. Founder of Hamilton Laboratories and author of Hamilton C shell, a software tools package for developers on Windows. Wrote the query language and ranker for the first release of Microsoft's Bing search engine.

Expertise in digital design, Verilog, C, C++, embedded systems, processors, device drivers, compilers, circuits, transistors, search engines, OS concepts, algorithms, heuristics, Linux, program management, intellectual property, licensing.

Education

MBA valedictorian, High Honors, Boston University, May 1987.
BS and MS, Electrical Engineering, Stanford University, June 1973.

Experience

Sep 2017 to Present — *Lecturer III, Computer Science and Engineering*
University of Michigan, Ann Arbor

Instructor for EECS 280, C++ and Object-Oriented Programming, and EECS 398, System Design in C++, a course I created where students work in teams of five or six to build a whole search engine from scratch. Also serve on our program committee and as an undergraduate advisor.

Jun 2013 to Jun 2017 — *Lecturer, Electrical Engineering*
University of Washington Bothell

Instructor for BEE 271, Digital Design with Verilog, BEE/CSS 371 Business of Technology, a course on entrepreneurship, and the labs for BEE 233 Circuits, BEE 332 Transistors and BEE 425 Microprocessors. Adviser to numerous teams on their senior Capstone projects. Past teams have built a diagnostic tool for large trucks (PACCAR), a pulse width modulated motor controller using a PIC 18F4550, a DSP for an ECG using a Zynq-7000 (both Phillips) and an SDRAM controller in Verilog for the open source mips32r1 soft processor (IEEE Nexus). Adviser to two students on independent study.

Served on committees to review our BEE 331/332 transistors sequence and to create a proposal for reducing the number of credits in the required sequence to make room for more electives.

Sep 1987 to Present President (sole proprietor), Hamilton Laboratories, Redmond

Author of Hamilton C shell, a tools package for Windows. Available in 32-bit and 64-bit versions. This is my original work reimagining the Unix C shell as a modern interactive language with procedures, block-structured local variables and floating point. The first release took 15 months and 35,000 lines of C and became the first multi-threaded application to ship on a PC in December 1988. It's now about 250,000 lines. [Wikipedia]

Separate multi-threaded top-down recursive descent (TDRD) compiler and execution units. Includes the rest of the usual suspects including more, grep, ls, mv, cp, rm, head, tail, diff, chown, tar, su and sudo from scratch on Windows. Plays nice, all the executables are signed, follows Windows conventions and works fine with but beats the pants off Cygwin. Free demo.

Jun 2007 to Sep 2008 Senior Program Manager, RealNetworks, Seattle

Hired and fired by cofounder, Phil Barrett, to PM his RealDVD product, a home DVD player that could save movies onto an internal hard disk, pulling synopsis and cast information from our cloud. Great product idea by Phil and CEO, Rob Glaser, but completely illegal under DMCA. (The movie studios won at trial.)

Wrote the market requirements (MRD), helped hire the engineering team, acted as point of contact for licensing the outside IP we needed and planned and ran several of our milestones (the ones that came in on time.) Ran our brainstorming sessions (e.g., to identify what parts of our design were patentable) and our weekly status meetings, prioritized our bugs, found a local vendor to build the 100 or so prototypes we needed, ran our beta test and managed the plan with Operations to get our cloud service online.

Nov 2006 to Mar 2007 Program Manager, Haydrian Corporation, Bellevue

Program manager for the engineering team at a startup building Linux-based systems to detect money laundering patterns for third world banks. Promptly ran out of money.

Sep 2002 to Jun 2005 Senior Software Development Engineer, Microsoft, Redmond

Wrote the ranker and the query language for the first release of Microsoft's search engine, now called Bing. Joined as the 9th member of the dev team. Contributed roughly 30,000 lines in C++, about 10% of all the LOC in the backend as of the time we went live in January 2005.

My code compiled queries to decide what the user was looking for, searched our inverted word index of 5 billion pages and then ordered the results. My compiler was a classic hand-written TDRD with a surprisingly complex grammar considering the average query is only 2.4 words. Queries were passed between machines as UTF-8 strings, so my compiler ran each time.

My ranker scored pages using a linear combination of over 700 heuristics (nearly all mine), tuned with gradient descent by a colleague using labeled pages. Sole inventor of the extraction technique used to count occurrences. By the time we went live, it took less time to generate the list of the 10 best pages than to create the snippets that went with them.

When I told classmates at a Stanford reunion in 2003 what I was doing, they didn't believe me. "Google must have 100 engineers on ranking." By now, Microsoft probably does as well. Best and worst job ever.

Jul 1981 to Sep 1987 *Workstation Software Manager, Prime Computer, Framingham, MA*

Second-line manager (1986-1987) of system software for our Unix CAD/CAM workstations. Led the multi-voting process that identified MIPS (CPU and compiler) and SGI (graphics and OS) as the only complementary suppliers that could meet our needs. Our project led to their eventual merger. Previously, author of a portable terminal emulator in C, then section manager (1984-1986) for Unix OS and drivers.

I went to Prime because they wanted to build a Xerox Star, only better. But Prime was never able to make the transition from minicomputers to workstations or PCs and went out of business about a year after I left.

Jun 1973 to Jul 1981 *Staff Engineer, IBM, Austin, TX*

Individual contributor to IBM's early micro-based OS/6 and Displaywriter word-processors. Hardware projects included a fault-tolerant serial communications FET chip, a micro-based sheet feed controller and a display processor for a full-page display. My display processor fit in ten IBM "Dutchess" TTL gate arrays, each with 100 NANDs and 34 NORs, had a real instruction set and resulted in my first patent, shared with a colleague who wrote the software.

Software projects included tools to create build instructions for node-for-node TTL models of our chips (they'd been drawing them by hand), "structured macros" allowing assembly code to be written as a high level language, and a novel compression scheme [PDF], all started as bootleg projects on my own.

IBM shaped my thinking on project planning through decomposition, the use of metrics and on the importance of quality and impeccable business ethics.

Summer 1972 *Intern, Pacific Gas & Electric, San Francisco*

Built an HP 2100 minicomputer system to transcribe analog instrumentation tapes of peak power usage by large industrial customers to standard-labeled IBM S/360 9-track tapes for use in billing. All the code was in assembly and all of it was mine, including the interrupt-driven device drivers for both tape drives, the time-base generator, and the ASR-33 teletype console.

Summers 1969 to 1971 *Intern, Martin-Marietta, Vandenberg AFB*

Wrote a System/360 macro assembly program for our Model 30 to analyze instrumentation tapes for the Titan IIID missile, e.g., to check that if one event should trigger another within so many milliseconds, that it happened. Entirely table-driven. Macros allowed the engineers to list the hundreds of changing relationships that needed to be checked without having to know how it was done.

Other

Registered Professional Engineer in Texas and Massachusetts.
Life senior member IEEE.
Beta Gamma Sigma honor society.
Tau Beta Pi eminent engineer, Stanford chapter, 2014.
Winner of the "10-year test of time" award at ICML 2015.
Amateur Extra license KD1UJ. Life member ARRL.
Moderator on BIX (BYTE Information Exchange), c. 1991-2001.
Avid bicyclist all my life.

Patents

1. D.A. Hamilton, P.R. Herrold, "Alphanumeric CRT display system with means for storing positional data calculated during an initial scan," US Patent 4247853, issued January 27, 1981, assigned to International Business Machines Corporation. [PDF]

2. R. Naam, R., N.A. Hamilton, O. Hurst-Hiller, B.D. Brewer, "Machine directed improvement of ranking algorithms," US Patent 7243102, issued July 10, 2007, assigned to Microsoft Corporation. [PDF]

3. N.A. Hamilton, "System and method for locating and presenting electronic documents to a user," US Patent 7254576, issued August 7, 2007, assigned to Microsoft Corporation. [PDF]

4. R. Naam, N.A. Hamilton, O. Hurst-Hiller, B.D. Brewer, "Generating a subindex with relevant attributes to improve querying," US Patent 7363296, issued April 22, 2008, assigned to Microsoft Corporation. [PDF]

5. B. Ramarathnam, G.N. Hullender, D.A. Shakib, N.A. Hamilton, "Dispersing search engine results by using page category information," US Patent 7428530, issued September 23, 2008, assigned to Microsoft Corporation. [PDF]

6. D.J. Watson, J. Moore, P.L. Barrett, N.A. Hamilton, "System and method for automatically creating a media archive from content on a recording medium," US Patent 8135761, issued March 13, 2012, assigned to RealNetworks, Inc. [PDF]

7. D. Giambalvo, J. Thaler, K. Showman, D.B. Dehghan, T.A. Sponheim, R. Jeffereis, K.J. Owens, C. Tanner, Q. Wang, N.A. Hamilton, D.C. Marl, N.R. Soy, "Application programming interface for administering the distribution of software updates in an update distribution system," US Patent 8245218, issued August 14, 2012, assigned to Microsoft Corporation. [PDF]

8. D.J. Watson, J. Moore, P.L. Barrett, N.A. Hamilton, "System and method for automatically creating a media archive from content on a recording medium," US Patent 8582954, issued November 12, 2013, assigned to RealNetworks, Inc. [PDF]

9. D.J. Watson, J. Moore, P.L. Barrett, N.A. Hamilton, "System and method for automatically creating a media archive from content on a recording medium," US Patent 8600950, issued December 3, 2013, assigned to RealNetworks, Inc. [PDF]

10. D.J. Watson, J. Moore, P.L. Barrett, N.A. Hamilton, "System and method for automatically creating a media archive from content on a recording medium," US Patent 9282308, issued March 8, 2016, assigned to Intel Corporation. [PDF]

11. D.J. Watson, J. Moore, P.L. Barrett, N.A. Hamilton, "System and method for automatically creating a media archive from content on a recording medium," US Patent 10070095, issued September 4, 2018, assigned to Intel Corporation. [PDF]

Publications

1. D.A. Hamilton, A.A. Schwartz, "Memory Arrangement Representing a Keyboard Having Both Fixed and Variable Characters", *IBM Technical Disclosure Bulletin,* Vol. 21, No. 9, February 1979, pp 3471-3472. [PDF]

2. D.A. Hamilton, P.R. Herrold, M.J. Ossefort, "Padding of Huffman Strings to Convenient Boundaries", *IBM Technical Disclosure Bulletin,* Vol. 22, No. 5, October 1979, pp 1773-1774. [PDF]

3. D.A. Hamilton, A.M. Herzik, S.S. Hobbs, C.R. Nunn, "Format Control Using Keyword Expansion", *IBM Technical Disclosure Bulletin,* Vol. 22, No. 6, November 1979, p 2218. [PDF]

4. D.A. Hamilton, S.S. Hobbs, C.R. Nunn, "Case and Keyboard Independent Word Compare", *IBM Technical Disclosure Bulletin,* Vol. 22, No. 12, May 1980, p 5239. [PDF]

5. D.A. Hamilton, A.M. Herzik, R.C. Nielsen, "Method for Capitalization Checking During Spelling Verification", *IBM Technical Disclosure Bulletin,* Vol. 22, No. 12, May 1980, p 5240. [PDF]

6. D.A. Hamilton, P.R. Herrold, M.J. Ossefort, "Digramatic Text Compression", *IBM Technical Disclosure Bulletin,* Vol. 23, No. 2, July 1980, pp 448-452. [PDF]

7. D.A. Hamilton, A.M. Herzik, W.S. Rosenbaum, "Document Supplement for Spelling Verification", *IBM Technical Disclosure Bulletin,* Vol. 23, No. 10, March 1981, p 4818. [PDF]

8. D.A. Hamilton, "Hamilton C shell Announcement", *IBM Personal Systems Developer,* Summer 1989, pp 119-121. [PDF]

9. D.A. Hamilton, "Mastering OS/2 Threads", *BYTE,* September 1990, pp 101-110. [PDF]

10. D.A. Hamilton, "A Smaller, Faster OS/2", *BYTE,* April 1991, pp 347-348. [PDF]

11. D.A. Hamilton, "How to Make OS/2 2.0 a Success", *Windows and OS/2 Magazine,* May 1991, pp 110-111. [PDF]

12. D.A. Hamilton, "But Does It Do Windows?", *Windows and OS/2 Magazine,* June 1991, pp 136-137. [PDF]

13. D.A. Hamilton, "Blue Ninja: The Movie", *Windows and OS/2 Magazine,* September 1991, pp 138-139. [PDF]

14. D.A. Hamilton, "Stardate 6.149", *Windows and OS/2 Magazine,* October 1991, pp 124-126. [PDF]

15. D.A. Hamilton, "NT: OS/2 of the Future?", *Windows Magazine,* November 1991, pp 126-127. [PDF]

16. D.A. Hamilton, "Peace", *Windows Magazine,* December 1991, p 133. [PDF]

17. D.A. Hamilton, "IBM Rolls the Dice with OS/2's Workplace Shell", *Windows Magazine,* February 1992, pp 157-158. [PDF]

18. D.A. Hamilton, "The Deadline was the End of the Year...Did They Make It?", *Windows Magazine,* March 1992, pp 137-138. [PDF]

19. D.A. Hamilton, "Better Than Windows? You Decide!", *Windows Magazine,* April, 1992, pp 60-64. [PDF]

20. D.A. Hamilton, "NT is Powerful, Real and Just Around the Corner", *Windows Magazine,* April 1992, pp 167-168. [PDF]

21. D.A. Hamilton, "OS/2 2.0 Goes Down to the Wire", *BYTE,* May 1992, pp 301-304. [PDF]

22. D.A. Hamilton, "Tailoring OS/2 Apps for NT", *Windows Magazine,* May 1992, pp 189-191. [PDF]

23. D.A. Hamilton, "Place Your Bets: 2.0 versus NT", *Windows Magazine,* June 1992, pp 217-218. [PDF]

24. D.A. Hamilton, "Is 32-bits Really Twice as Good?", *Windows Magazine,* July 1992, pp 266-268. [PDF]

25. D.A. Hamilton, "Full Steam Ahead Into the Future", *Windows Magazine,* August 1992, pp 205-206. [PDF]

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28. D.A. Hamilton, "A Few Suggestions For Microsoft", *Windows Magazine,* November 1992, pp 293-295. [PDF]

29. D.A. Hamilton, "All My Children", *Windows Magazine,* December 1992, pp 357-358. [PDF]

30. D.A. Hamilton, "Things That Make You Go Boom!" *Windows Magazine,* January 1993, pp 263-264. [PDF]

31. D.A. Hamilton, "The Operating System that Are Las Vegas", *Windows Magazine,* February 1993, pp 327-331. [PDF]

32. D.A. Hamilton, "Navigate Your Way with Mapped Files", *Windows Magazine,* March 1993, pp 317-320. [PDF]

33. D.A. Hamilton, "Getting at Your Raw Devices", *Windows Magazine,* April 1993, pp 335-338. [PDF]

34. D.A. Hamilton, "The Windows NT Registry", *Windows Magazine,* May 1993, pp 225-228. [PDF]

35. D.A. Hamilton, "Will NT Take Over the Desktop?", *Windows Magazine,* June 1993, pp 219-220. [PDF]

36. D.A. Hamilton, "How Much Power Keeps NT Afloat?", *Windows Magazine,* July 1993, pp 189-190. [PDF]

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38. D.A. Hamilton, "NT: The Greatest Thing Since Sliced Bread?", *Windows Magazine,* September 1993, pp 245-246. [PDF]

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